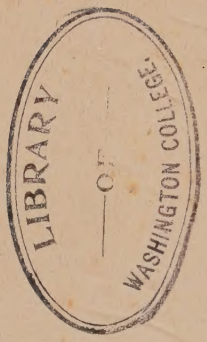
1051
T52
V. 1.



3646

LB
105
T5

EDUCATIONAL PSYCHOLOGY

VOLUME I

THE ORIGINAL NATURE OF MAN

EDUCATIONAL PSYCHOLOGY

VOLUME I

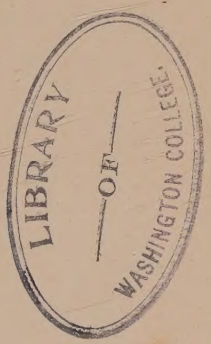
THE ORIGINAL NATURE OF MAN

3095

BY

EDWARD L. THORNDIKE

PROFESSOR OF EDUCATIONAL PSYCHOLOGY IN TEACHERS COLLEGE
COLUMBIA UNIVERSITY



PUBLISHED BY
Teachers College, Columbia University
NEW YORK
1920

COPYRIGHT 1913, BY
EDWARD L. THORNDIKE

MASON PRINTING CORPORATION
SYRACUSE NEW YORK

185
T5
V.

TO THE MEMORY
OF
WILLIAM JAMES

PREFACE

This volume, which describes man's original mental equipment—the inherited foundations of intellect, morals and skill,—is the first of three, which, together, give the main facts of educational psychology. The second volume, on *The Psychology of Learning,* treats of the laws of learning in general, the improvement of mental functions by practice and their deterioration by fatigue. The third volume, on *Individual Differences and Their Causes,* treats of the variations of individual men around the general type characteristic of man as a species, and of the influence of sex, race, immediate ancestry, maturity and training in producing these variations. This third volume was written first, appearing in 1903 under the general title, *Educational Psychology.*

A systematic account of present knowledge of the dynamics of human nature and behavior is much needed for students of education and other forms of human control. These volumes represent a selection from, and organization of, recent work in experimental, statistical and comparative psychology, such as will, I hope, economize effort and diminish the chances of error for such students.

The reader to whom these volumes bring any new insight into human nature, power in the quantitative treatment of mental facts, or interest in the rich details of concrete human nature, will become a sharer in my debt to my teachers, William James and James McKeen Cattell, and to that intrepid devotee to concrete human nature, Stanley Hall, whose doctrines I often attack, but whose genius I always admire.

Parts of Chapters I, II, VII, IX, X and XVII of this volume constituted four lectures given at Union College in March, 1913, under the provisions of the Ichabod Spencer Foundation.

Teachers College, Columbia University,
March, 1913

CONTENTS

Chapter		Page
I.	Introduction	1
	Original *versus* Learned Tendencies	
	The Problems of Original Nature	
II.	General Characteristics of Original Tendencies	5
	Names for Original Tendencies	
	The Components of an Original Tendency	
	The Action of Original Tendencies	
	Stages in the Description of Human Nature	
III.	Inventories of the Original Nature of Man	16
	James' Inventory	
	Indefiniteness in Descriptions of Original Tendencies	
	Criteria of the Probable Unlearnedness of a Tendency	
IV.	Sources of Information	27
	The Discovery of Original Tendencies by Systematic Observation of Children	
	The Discovery of Original Tendencies by a Census of Opinions	
	Other Sources	
	The Insecurity of Present Information	
V.	Responses of Sensitivity, Attention and Gross Bodily Control	43
	Sensory Capacities	
	Original Attentiveness	
	Gross Bodily Control	
VI.	Food Getting, Protective Responses, and Anger	50
	Food Getting	

CHAPTER PAGE

Habitation
Fear
Fighting
Anger

VII. RESPONSES TO THE BEHAVIOR OF OTHER HUMAN BEINGS 81
Motherly Behavior
Responses to the Presence, Approval and Scorn of Men
Mastering and Submissive Behavior
Other Social Instincts

VIII. RESPONSES TO THE BEHAVIOR OF OTHER HUMAN BEINGS: IMITATION 108
General Imitativeness
The Imitation of Particular Forms of Behavior

IX. ORIGINAL SATISFIERS AND ANNOYERS 123
The Original Nature of Wants, Interests and Motives
The Principles of Readiness
The Explanation of 'Multiple Response' or 'Varied Reaction'

X. TENDENCIES TO MINOR BODILY MOVEMENTS AND CEREBRAL CONNECTIONS 135
Vocalization, Visual Exploration and Manipulation
Other Possible Specializations
Curiosity and Mental Control
Play
'Random' Movements

XI. THE EMOTIONS AND THEIR EXPRESSION 150
Difficulties in Identifying and Studying Emotional States
McDougall's Inventory of Original Tendencies to Emotional States

CHAPTER PAGE

The Relation of Emotions to the Movements which "Express" Them
The Original Bonds of the Expressive Movements

XII. CONSCIOUSNESS, LEARNING AND REMEMBERING..... 170
Original Tendencies to Consciousness
The Capacity to Learn
Limitations to Modifiability
The Supposed Formation of Connections by "Faculties"
The Supposed Formation of Connections by the Perception of Their Action in Another
The Supposed Formation of Connections by the Power of an Idea to Produce the Act which it Represents
Attempted Explanations of Learning by the Laws of Exercise Alone
Remembering

XIII. SUMMARY, CRITICISM AND CLASSIFICATION..... 195
The Action of Fragments and Combinations of Original Tendencies
The Variability of Men in Original Tendencies
The Modifiability of Original Tendencies
A Summary of Man's Original Nature
Criticisms
The Classification of Original Tendencies

XIV. THE ANATOMY AND PHYSIOLOGY OF ORIGINAL TENDENCIES 209
The Structure of the Neurones
The Arrangement of the Neurones
Sensitivity and Conductivity
The Physiology of the Capacity to Learn and of Readiness
The Physiology of Delay and Transitoriness in Original Tendencies

XV. THE SOURCE OF ORIGINAL TENDENCIES..... 230
The Hypothesis of the Transmission of Acquired Traits

CHAPTER PAGE

The Selection of 'Chance' Variations in the Germ Plasm
The Continuity of Original Tendencies
The Extent of Selection for Intellectual and Moral Superiority

XVI. THE ORDER AND DATES OF APPEARANCE AND DISAPPEARANCE OF ORIGINAL TENDENCIES..... 245
The Recapitulation Theory
The Utility Theory
The Evidence
The Dates of Appearance of Particular Tendencies
The Gradual Waxing of Delayed Instincts and Capacities
The Probable Frequency of Transitoriness in Original Tendencies

XVII. THE VALUE AND USE OF ORIGINAL TENDENCIES.... 270
The Doctrine of Nature's Infallibility
The Doctrine of Catharsis
Defects in Man's Original Nature
The Use of Original Tendencies in Detail
Original Tendencies as Ends: Emulation in the Case of School 'Marks'
Original Tendencies as Means: Suggestion in Education
Original versus 'Natural' Tendencies
The Importance of the Original Satisfiers and Annoyers
The True Significance of Plasticity
Which Instincts are of Most Worth
Original Nature the Ultimate Source of All Values

BIBLIOGRAPHY OF REFERENCES MADE IN THE TEXT..... 313

INDEX 320

The Original Nature of Man

CHAPTER I

Introduction

The arts and sciences serve human welfare by helping man to change the world, including man himself, for the better. The word education refers especially to those elements of science and art which are concerned with changes in man himself. Wisdom and economy in improving man's wants and in making him better able to satisfy them depend upon knowledge—first, of what his nature is, apart from education, and second, of the laws which govern changes in it. It is the province of educational psychology to give such knowledge of the original nature of man and of the laws of modifiability or learning, in the case of intellect, character and skill.

A man's nature and the changes that take place in it may be described in terms of the responses—of thought, feeling, action and attitude—which he makes, and of the bonds by which these are connected with the situations which life offers. Any fact of intellect, character or skill means a tendency to respond in a certain way to a certain situation—involves a *situation* or state of affairs influencing the man, a *response* or state of affairs in the man, and a *connection* or bond whereby the latter is the result of the former.

ORIGINAL *versus* LEARNED TENDENCIES

Any man possesses at the very start of his life—that is, at the moment when the ovum and spermatozoon which are to produce him have united—numerous well-defined tendencies

to future behavior.* Between the situations which he will meet and the responses which he will make to them, pre-formed bonds exist. It is already determined by the constitution of these two germs, that under certain circumstances he will see and hear and feel and act in certain ways. His intellect and morals, as well as his bodily organs and movements, are in part the consequence of the nature of the embryo in the first moment of its life. What a man is and does throughout life is a result of whatever constitution he has at the start and of all the forces that act upon it before and after birth. I shall use the term 'original nature' for the former and 'environment' for the latter. His original nature is thus a name for the nature of the combined germ-cells from which he springs, and his environment is a name for the rest of the universe, so far as it may, directly or indirectly, influence him.

In one sense nothing in human nature is due exclusively to either one of these factors. Those tendencies most dependent on the original nature of the organism require certain coöperation on the part of the environment; and those most dependent on outside circumstances still require some coöperation on the part of the organism. Even the first splitting of the fertilized ovum into two cells occurs only when adequate stimuli, for instance of temperature, act *ab extra;* and even the death of the organism by starvation occurs only, its date at least, in accord with certain responses from within.

But in another sense the most fundamental question for human education asks precisely that we assign separate shares in the causation of human behavior to man's original nature on the one hand and his environment or nurture on the other.

*Since the term, *behavior*, has acquired certain technical meanings in its use by psychologists, and since it will be frequently used in this book, the meaning which will be attached to it here should perhaps be stated. I use it to refer to those activities of thought, feeling, and conduct in the broadest sense which an animal—here, man—exhibits, which are omitted from discussion by the physics, chemistry and ordinary physiology of today, and which are referred by popular usage to intellect, character, skill and temperament. Behavior, then, is not contrasted with, but inclusive of, conscious life.

In this sense we neglect, or take for granted, the coöperating action of one of the two divisions in order to think more successfully and conveniently of the action of the other. Thus, we say that man is by his original nature *able to* see, but that *what* he sees depends upon the environment he meets; or that original nature makes him respond to certain objects by fears, which environmental training weakens; or that a child instinctively conveys food to his mouth with the naked hand, but by habit comes to use a spoon as well; or that native curiosity develops, by proper training, into interests in the arts and sciences.

The custom of thus abstracting out the original nature of man in independence of any and all influences upon it is so general and so useful that it is best to follow it throughout, remembering, however, that from the first moments after the fertilization of the ovum, a human individual is always an *acquired* nature,—that in the most original behavior discoverable, such as breathing or suckling, some outside conditions are involved,—and that in the most exclusively acquired or learned arts, such as knowledge of the square root of 256, some element of original capacity has a share.

THE PROBLEMS OF ORIGINAL NATURE

Elementary psychology acquaints us with the fact that men are, apart from education, equipped with tendencies to feel and act in certain ways in certain circumstances—that the response to be made to a situation may be determined by man's inborn organization. It is, in fact, a general law that, other things being equal, the response to any situation will be that which is by original nature connected with that situation, or with some situation like it. Any neurone will, when stimulated, transmit the stimulus, other things being equal, to the neurone with which it is by inborn organization most closely connected. The basis of intellect and character is this fund of unlearned tendencies, this original arrangement of the neurones in the brain.

The original connections may develop at various dates and

may exist for only limited times; their waxing and waning may be sudden or gradual. They are the starting point for all education or other human control. The aim of education is to perpetuate some of them, to eliminate some, and to modify or redirect others. They are perpetuated by providing the stimuli adequate to arouse them and give them exercise, and by associating satisfaction with their action. They are eliminated by withholding these stimuli so that they abort through disuse, or by associating discomfort with their action. They are redirected by substituting, in the *situation-connection-response* series, another response instead of the undesirable original one; or by attaching the response to another situation in connection with which it works less or no harm, or even positive good.

It is a first principle of education to utilize any individual's original nature as a means to changing him for the better—to produce in him the information, habits, powers, interests and ideals which are desirable.

The behavior of man in the family, in business, in the state, in religion and in every other affair of life is rooted in his unlearned, original equipment of instincts and capacities. All schemes of improving human life must take account of man's original nature, most of all when their aim is to reverse or counteract it.

A study of the original nature of man as a species and of the original natures of individual men is therefore the primary task of human psychology. This volume is concerned with only the former task. The main topics of such a study are:

1. The description and classification of original tendencies,
2. Their anatomy and physiology,
3. Their source or origin,
4. The order and dates of their appearance and disappearance, and
5. Their control in the service of human ideals.

CHAPTER II

General Characteristics of Original Tendencies

NAMES FOR ORIGINAL TENDENCIES

Three terms, reflexes, instincts, and inborn capacities, divide the work of naming these unlearned tendencies. When the tendency concerns a very definite and uniform response to a very simple sensory situation, and when the connection between the situation and the response is very hard to modify and is also very strong so that it is almost inevitable, the connection or response to which it leads is called a reflex. Thus the knee-jerk is a very definite and uniform response to the simple sense-stimulus of sudden hard pressure against a certain spot. It is hard to lessen, to increase, or otherwise control the movement, and, given the situation, the response almost always comes. When the response is more indefinite, the situation more complex, and the connection more modifiable, instinct becomes the customary term. Thus one's misery at being scorned is too indefinite a response to too complex a situation and is too easily modifiable to be called a reflex. When the tendency is to an extremely indefinite response or set of responses to a very complex situation, and when the connection's final degree of strength is commonly due to very large contributions from training, it has seemed more appropriate to replace reflex and instinct by some term like capacity, or tendency, or potentiality. Thus an original tendency to respond to the circumstances of school education by achievement in learning the arts and sciences is called the capacity for scholarship.

There is, of course, no gap between reflexes and instincts, or between instincts and the still less easily describable original tendencies. The fact is that original tendencies range with respect to the nature of the responses from such as are single,

simple, definite, uniform within the individual and only slightly variable amongst individuals, to responses that are highly compound, complex, vague, and variable within one individual's life and amongst individuals. They range with respect to the nature of the situation from simple facts like temperature, oxygen or humidity, to very complex facts like 'meeting suddenly and unexpectedly a large animal when in the dark without human companions,' and include extra-bodily, bodily, and what would be commonly called purely mental, situations. They range with respect to the bond or connection from slight modifiability to great modifiability, and from very close likeness amongst individuals to fairly wide variability.

Much labor has been spent in trying to make hard and fast distinctions between reflexes and instincts and between instincts and these vaguer predispositions which are here called capacities. It is more useful and more scientific to avoid such distinctions in thought, since in fact there is a continuous gradation.

THE COMPONENTS OF AN ORIGINAL TENDENCY

A typical reflex, or instinct, or capacity, as a whole, includes the ability to be sensitive to a certain situation, the ability to make a certain response, and the existence of a bond or connection whereby that response is made to that situation. For instance, the young chick is sensitive to the absence of other members of his species, is able to peep, and is so organized that the absence of other members of the species makes him peep. But the tendency to be sensitive to a certain situation may exist without the existence of a connection therewith of any further exclusive response, and the tendency to make a certain response may exist without the existence of a connection limiting that response exclusively to any single situation. The three-year-old child is by inborn nature markedly sensitive to the presence and acts of other human beings, but the exact nature of his response varies. The original tendency to cry is very strong, but there is no one situation to which it is exclusively bound.

Original nature seems to decide that the individual will respond somehow to certain situations more often than it decides just what he will do, and to decide that he will make certain responses more often than it decides just when he will make them. So, for convenience in thinking about man's unlearned equipment, this appearance of *multiple response* to one same situation and multiple *causation* of one same response may be taken roughly as the fact.

It must not, however, be taken to mean that the result of an action set up in the sensory neurones by a situation is essentially unpredictable—that, for instance, exactly the same neurone-action (paralleling, let us say, the sight of a dog by a certain two-year-old child) may lead, in the two-year-old, now to the act of crying, at another time to shy retreat, at another to effusive joy, and at still another to curious examination of the newcomer, all regardless of any modification by experience. On the contrary, *in the same organism the same neurone-action will always produce the same result—in the same individual the really same situation will always produce the same response.* The apparent existence of an original sensitivity unconnected with any one particular response, so that apparently the same cause produces different results, is to be explained in one of two ways. First, the apparently same situations may really be different. Thus, the sight of a dog to an infant in its mother's arms is not the same situation as the sight of a dog to an infant alone on the doorstep. Being held in its mother's arms is a part of the situation that may account for the response of mild curiosity in the former case and fear in the latter. Second, if the situations are really identical, the apparently same organism really differs. Thus a dog seen by a child, healthy, rested and calm, may lead to only curiosity, whereas, if seen by the same child, ill, fatigued, and nervously irritable, it may lead to fear. The organism may differ by being differently disposed in its sensory apparatus, in its associative or connecting apparatus, in its motor neurones, in its muscular condition, or in other organs concerned in the response. These

predispositions may come through conditions of nutrition, poisoning, fatigue, coöperative stimulation, etc., etc.*

Similarly, the really same response is never made to different situations by the same organism. When the same response seems to be made to different situations, closer inspection will show that the responses do differ; or that the situations were, in respect to the element that determined the response, identical; or that the organism is itself different. Thus, though 'a ball seen,' 'a tin soldier seen,' and 'a rattle seen' alike provoke 'reaching for,' the *total* responses do differ, the central nervous system being provoked to three different responses manifested as three different sense-impressions—of a ball, of a tin soldier, and of a rattle. Thus, if 'ball grasped,' 'tin soldier grasped,' and 'rattle grasped' alike provoke 'throwing,' it is because only one particular component, common to the three situations, is effective in determining the act. Thus, if a child now weeps whenever spoken to, whereas before he wept only when hurt or scolded, it is because he is now exhausted, excited, or otherwise changed.

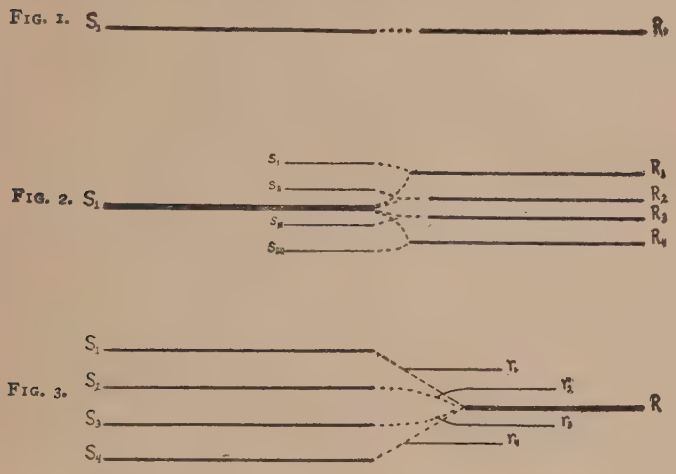
The original connections between situation and response are never due to chance in its true sense, but there are many minor coöperating forces by which a current of conduction in the same sensory neurones or receptors may, on different occasions, diverge to produce different results in behavior, and by which very different sensory stimulations may converge to a substantially common consequence.

One may use several useful abstract schemes by which to think of man's original equipment of reflexes, instincts and capacities. Perhaps the most convenient is a series of S-R connections of three types. Some are of the type—S_1 leads to R_1, its peculiar sequent; some are of the type—S_1 leads to R_1 or R_2 or R_3 or R_4 or R_5 etc., according to very minor casual contributory causes; some are of the type—S_1 leads to $R+r_1$, S_2 leads to

*Their most potent causes are the effects of previous experience, but these do not concern the present inquiry, since all effects of previous experience are, of course, to be rigorously excluded from a description of original nature.

$R+r_2$, S_3 leads to $R+r_3$ etc., where r_1, r_2 and r_3 are minor results.

Graphically this scheme is represented by Figs. 1, 2 and 3.



Besides such a system of tendencies deciding which response any given situation will produce, there are certain tendencies that decide the status of features common to all situation-response connections. There is, for example, in man an original tendency whereby any connection once made tends, other things being equal, to persist. There is also a tendency whereby any connection or response may or may not be in readiness to be made—may be excited to action easily or with difficulty. These tendencies toward the presence or absence of a certain feature in all connections or responses will be examined by themselves in due time.

THE ACTION OF ORIGINAL TENDENCIES

We can imagine a man's life so arranged that one after another original tendency should be called into play, each by itself. Let him be in a certain status, and let, successively, the light grow five times as intense, snuff be blown up his nostrils, a dear friend approach, and the earth quake, without

in any case any other changes whatever either in the surroundings or in his internal status. Then the pupils of his eyes would contract, he would sneeze, he would smile, and he would start.

The original tendencies of man, however, rarely act one at a time in isolation one from another. Life apart from learning would not be a simple serial arrangement, over and over, of a hundred or so situations, each a dynamic unit; and of a hundred or so responses, fitted to these situations by a one-to-one correspondence. On the contrary, they coöperate in multitudinous combinations. Their combination may be apparent in behavior, as when the tendencies to look at a bright moving object, to reach for a small object passing a foot away, and to smile at a smiling familiar face combine to make a baby smilingly fixate and reach for the watch which his father swings. Or the combination may take place unobserved in the nervous system, as when a large animal suddenly approaching a solitary child makes him run and hide, though the child in question would neither run nor hide at solitude, at the presence of the animal, or at the sudden approach of objects in general.

It is also the case that any given situation does not act absolutely as a unit, producing either one total response or none at all. Its effect is the total effect of its elements, of which now one, now another may predominate in determining response, according to coöperating forces without and within the man. The action of the situations which move man's original nature is not that of some thousands of keys each of which unlocks one door and does nothing else whatever. Any situation is a complex, producing a complex effect; and so, if attendant circumstances vary, a variable effect. In any case it does, so to speak, what it can.

Ultimately, indeed, every fact in human life is a case of the co-action of all the universe except the man in question, and the condition of the man in question at that instant. In taking anything short of all the universe save him and calling it the situation, we are abstracting—are replacing the total effective

situation by some element of it. Also, in taking anything short of the rich entirety of the man at that instant as the organism, we are abstracting—are replacing the total effective conditions of the response by some of their main features. Such abstraction is, of course, the procedure of common sense and of science. Everywhere there is abundant justification for building up an abstract scheme of the responses which situations *a, b, c,* singly evoke, though in fact they never act singly; or of the bonds between situation *d* and a total set of responses, though in fact the various component elements of *d* are never present in just the same proportions so that the very existence of *d* as a thing by itself is a myth.

STAGES IN THE DESCRIPTION OF HUMAN NATURE

The history of modern explanations of human intellect, character and skill shows three notable stages. In the first, certain mythical potencies were postulated which, when aroused to action by the events of a man's life, produced his thoughts and acts. These potencies were 'instinct,' which could do almost anything in a pinch, the 'will,' and the 'faculties'—memory, attention, reasoning and the like. The actual information about human nature carried by these explanations was, as in the current uses of 'instinct of preservation' or 'capacity for self-expression,' that man was able to attain certain results in living. To say that he had the faculty or capacity of memory said that his present behavior was in one way or another influenced by his past experiences. To say that he had the power of reason was to say that he managed by thought to get along with conditions which would baffle a stone, tree, rabbit, or himself if he had not thought. Science of this sort could prophesy very little of the behavior of any given man in any given situation.

In the second stage, behavior is defined in terms of more or less clearly described states of affairs to which man responds by more or less clearly described thoughts, movements, emotions or other responses. 'Instinct' gives way to 'instincts'—each referring to a bond between some situation and some response.

In place of referring the influence of the past on the present to a ubiquitous demon called memory who alternately absorbs and excretes facts, men study the formation of particular associations or bonds, the conditions of their permanence and later effectiveness. Reasoning becomes a convenient name for the cases of behavior where some part or element in the situation is predominant in determining the response, and where selection takes place amongst plans in view of ideas about their value for some end. We thus seek, in this second stage of thought, not a potency that vaguely produces large groups of consequences, but bonds that unite particular responses or reactions to particular situations or stimuli. Science of this sort leads to many successful prophecies of what a man will think or do in a given case, but these prophecies are crude and subject to variability and qualification.

In the third stage, behavior will be defined in terms of events in the world which any impartial observer can identify and, with proper facilities, verify. Each situation will be stated as just this state of affairs in nature; the response will be stated as just this event in the man; and the bond will be stated as just this set of habits or just that arrangement and condition of the man's neurones by which the event in the man is brought to pass when that state of affairs is present in nature. Science of this sort, by giving perfect identifiability and fuller knowledge, leads to completer and finer prophecy and control of human nature.

The descriptions of certain tendencies to behavior—for example, that of paramecium in response to certain chemicals, that of the dog in response to a drop of acid on certain spots of his skin, and that of man in response to a tap on a certain spot on the knee—are advancing from the second to the third stage. The descriptions of the instincts of fear, anger, and the like are advancing from the first to the second stage. But scores of such terms as musical ability, mathematical ability, technical skill, scholarship, artistic temperament, piety, quarrelsomeness, conventionality, coöperativeness, the instinct of

self-preservation, the social instinct, the gambling instinct, the play instinct, the instinct for justice, and the like, witness to the great number of human tendencies whose descriptions are still of the pattern of the first stage—mere statements that somehow or other a certain result is attained.

Instincts as mythical potencies are, to say the least, not rigorously excluded by even two very recent and in many ways admirable discussions—one, of the relation of instinct to intelligence; the other, of the significance of instincts for a philosophy of education. The eminent psychologists who discussed 'Instinct and Intelligence' in the British Journal of Psychology two years ago ['10, vol. 3, pp. 209-266] again and again speak of instinct as if it were something like a heart or a thyroid gland or a 'memory' or an 'imagination,' which did this and that for a man. Henderson seems deliberately to advocate remaining in this first stage of thought in the case of unlearned tendencies. He says:—

"The instincts are the functions of the organism considered from the point of view of the needs that they supply. Most lists of instincts are selected according to this conception, as the feeding instinct, the instinct of fear, of sociability, of acquisitiveness, of curiosity. On the other hand, the instinctive act is a complex of movements that constitutes an hereditarily preferred method of carrying out one or many instincts. Crying, for example, is an instinctive act, and it may be resorted to as a means of satisfying the instinct of hunger, that of fear, that of sociability, and, indeed, almost any instinct that appears during the period when this type of activity prevails. Just as one instinctive act may be utilized by many instincts, so one instinct may function by means of a variety of types of instinctive or habitual activity. Thus the instinct of fear may lead to a resort to the instinctive acts of crouching, lying still, or hiding, or that of flight, or in extreme cases, perhaps, that of desperate fighting." ['10, p. 65]

Next to the separation of what is original from what is learned, the main task of a description of the original nature of man is to progress from the first to the second of these stages.*

*Progress from the second to the third stage will depend upon researches yet to be made. If the inventory and description of the original intellect

For it has remained a common practice to describe an original tendency only by its results even when, by enough attention to facts, the situation and the response could have been at least roughly defined. This is unfortunate. It is no more necessary, and is much less accurate, to describe man loosely as possessed of an 'instinct of self-preservation' than it is to describe oxygen as possessed of an 'instinct of rust production.'

The real facts meant, in this and in all cases, are a multitude of more or less specialized responses to certain actual situations, —in this sample case, drawing back from a missile or blow, running from this, striking back at that, swallowing what tastes sweet, spitting out what tastes very bitter, going to sleep after long exertion, waking up after long sleep, picking up the small object seen, putting in one's mouth the object picked up, etc., etc. The instinct is not a response to, 'Preserve self or destroy self?' but to particular material objects and living animals or plants. Its moving impulse is not 'to preserve self—to stay alive' but some such concrete feeling as 'get rid of this hunger—to feel comfortably full again' or 'to get away from that horrid beast.' In the case of the instinct proper, unmodified by experience, the moving impulse is not a notion of end or aim at all. For, originally, the situation itself provokes the response irrespective of any thoughts of the consequences. Even sophisticated adults eat oftenest because they *are* hungry or see or smell food, not because they *will be* full.

The name is especially misleading because the same instincts which usually result in preservation may result in death. The child's struggles against the operating surgeon or the tasting of lye, corrosive sublimate and the like along with spools and candy, are samples of the thousands of such possibilities.

and character of man as a species to be given in this volume were to be confined to *perfectly* identifiable and demonstrable bonds between *perfectly* identified situations and responses, hardly a word could be said about one out of ten of the instincts and capacities with which education, politics, business and philanthropy are chiefly concerned.

There is no unlearned tendency to respond to 'life vs. death,' and probably there is none which inevitably, under every set of conditions, does result in life rather than in death. Indeed, only after the tendency is defined in terms of an identifiable response to an identifiable situation can one profitably inquire whether it is original or acquired, or how far it is original and how far acquired.

If one insists resolutely on replacing a list of instincts as magic potencies which produce certain results, by a statement of even roughly definable bonds between actual situations and actual thoughts, feelings and acts, it becomes necessary to part company with the stock descriptions of instincts. It will be a great advantage if thought about the life of man can be advanced to a level of description which will exclude teleological lists having as their themes such mythical potencies as the 'instinct of self-preservation,' which makes you stay alive—the 'social instinct,' which makes you construct a society,—the 'parental instinct,' which makes you treat your own flesh and blood so as to favor them in all ways,—the 'religious instinct,' which makes you believe in a world of spirits,—'constructiveness,' which makes you build up all sorts of edifices,—'destructiveness,' which makes you tear all sorts of edifices down,—or 'fear,' which makes you avoid danger. To secure this advantage for students of education is one main purpose of the next nine chapters.

CHAPTER III

Inventories of the Original Nature of Man

As a first step toward a reasonable estimate of man's original equipment, we may consider the summary of the special human instincts which James ['93*] reported as the combined result of the work of previous writers (notably, W. Preyer, ['81] and G. H. Schneider ['80, '82]) and of his own observations.

For convenience I repeat the list itself, where possible in James' own words, but for the detailed descriptions of each tendency the reader is referred to Chapter XXIV of James' *Principles of Psychology.*†

James first quotes samples of the reflexes listed by Preyer,§ such as crying, sneezing, snuffling, snoring, coughing, sighing, sobbing, gagging, vomiting, hiccuping, starting, moving the limb in response to its being tickled, touched or blown upon, spreading the toes in response to being touched, tickled or stroked on the sole of the foot, extending and raising the arms at any sudden sensory stimulus, or the quick pulsation of the eyelid. Then follows his list and descriptions of the more complex original tendencies. Where possible I have summarized each description in one phrase for the situation (printed at the left of the page) and one for the response (printed at the right.) Where neither is described, I put (in the centre of the

*First published, however, in a series of articles in 1887.

†It should be noted that James does not pretend that this list is exhaustive or that his descriptions are precise, his interest being in demonstrating the vagueness, modifiability and wide range of human instincts, rather than in full enumeration or exact identification of the situations and responses concerned. It is, at all events, one of the best single lists available, and its descriptions are much above the average in accuracy.

§ See *The Senses and the Will,* by W. Preyer (Eng. trans.), Chap. X.

line and capitalized) the word or phrase used by James to describe the instinct as a whole.

JAMES' INVENTORY

Sucking

an object placed in the mouth ..... biting

Chewing

Grinding the teeth

sugar ..... licking
a sweet taste ..... a characteristic grimace
a bitter taste ..... a characteristic grimace

Spitting out

an object which touches the fingers or toes ..... clasping
an object seen at a distance ..... attempts to grasp it
an object seen at a distance ..... pointing at it
an object seen at a distance ..... making a peculiar sound expressive of desire
an object grasped ..... carrying it to the mouth
bodily discomfort ..... crying
hunger ..... crying
pain ..... crying
being noticed ..... smiling
being fondled ..... smiling
being smiled at ..... smiling
an object attended to ..... protruding the lips
Turning the head aside, frowning, bending back the body, and holding the breath
(these last three accompanying the first mentioned)

Holding head erect
Sitting up
Standing
Creeping
Walking
Climbing
Cooing and gurgling

hearing a sound ..... imitating the sound
seeing a gesture ..... imitating a gesture

Emulation or rivalry
Pugnacity
Anger
Resentment

the sight of suffering or danger to others ..... interest and acts of relief

"all living beasts, great and small toward which a contrary habit has not been found—all human beings in whom we perceive a certain intent toward us, and a large number of human beings who offend us peremptorily, either by their look, or gait, or by some circumstance in their lives which we dislike" ..... hunting

certain noises ..... fear
strange men ..... fear
strange animals ..... fear
certain kinds of vermin ..... fear
solitude (during infancy) ..... fear
black things ..... fear
dark places ..... fear
holes and corners ..... fear
high places ..... fear
certain ideas of supernatural agency ..... fear
a human corpse ..... fear
fear ..... running
fear ..... remaining semi-paralyzed
fear ..... trembling

Appropriation or acquisitiveness or the proprietary instinct

any object which pleases.....attention, snatching

any object which pleases.....attention, begging

Envy

Jealousy

To form collections

Constructiveness

"whatever things are plastic to his hands he must".....remodel into shapes of his own"

Habitation—"to make a sheltered nook, open on only one side"

"when not altogether unenclosed".....he feels less exposed and more at home than when lying all abroad"

Play

"another boy who runs provokingly near".....running after him

"seeing another child pick up some object".....trying to get it

"someone trying to take an object away".....trying to get away with it

Love of festivities, ceremonies, and ordeals

"concerted action as one of an organized crowd".....excitement

perceiving such a crowd.....a tendency to join them and do what they are doing and an unwillingness to be the first to leave off and go home alone"

Curiosity

novelty in any movable feature of the environment.....being excited and irritated

Sociability and shyness

being alone.....discomfort

meeting a stranger.....shyness

Secretiveness

"unfamiliar human beings, especially those whom we respect".....

"the arrest of whatever we are saying or doing....coupled often with the pretense that we were not saying or doing that thing, but possibly something different"

love affairs.....to conceal them

Cleanliness

"excrementitious and putrid things, blood, pus, entrails and diseased tissues".....repugnance

Modesty, shame (?)

Personal isolation

Love between the sexes

Coyness

Parental love

Indefiniteness in Descriptions of Original Tendencies

This list, and still more so James' full account, should suggest at once the question, "How can the description of a tendency in human nature be so made as to ensure that all competent students can from it identify the tendency—know what they are to look for or argue about?" For example, no one doubts the truth of the statement, "The tendency which we call curiosity is more or less instinctive," but also no one could learn from it just what is instinctive. Obviously, whether or not a tendency is unlearned, cannot be tested until one knows

what the tendency is well enough to observe whether it is present or not. Nor can a tendency be used in education or other forms of social control until one knows what it itself is. The statement that 'Curiosity,' 'Rivalry,' 'Pugnacity,' and 'Constructiveness' are original tendencies gives us more questions than answers.

The answer to the question is, of course, "By defining the tendency as a situation, a response and a degree of probability that apart from training the latter will happen when the former does." Suppose the statement about curiosity to be: "To the world in general, a child, apart from training, makes, much oftener than chance would allow, responses of—looking at, touching, tasting, manipulating and further sensory examination. To new experiences, a child, apart from training, makes, much oftener than chance or other instincts would allow, responses of feeling satisfaction and of doing nothing to avoid and something to continue or repeat the experiences." This statement, though far indeed from a model description, is much more suitable than the mere word 'curiosity' to guide observation, thought and practice. Greater exactitude in the description is to be got in the same way, by describing objectively further details of the situations, the responses, and their bonds.

Often in James' list the *response* is described, at least in gross terms, such as 'weeping,' 'standing,' 'creeping,' 'following,' 'turning the head aside' or 'impersonating,' but the *situations* are left quite unidentifiable. It is, of course, helpful to know that crying or turning the head aside are unlearned responses, but it would be still more helpful to know at what children instinctively cry and from what objects they turn the head aside. Less often the *situation* is described, at least in gross terms, such as a 'sweet taste' or 'hearing a sound,' or 'the sight of blood,' but the *responses* are left unidentifiable. 'A characteristic grimace at a sweet taste,' though better than nothing, is hardly an adequate description. 'Imitating a sound heard' may mean anything from duplicating it to making a sound to some slight extent like it.

Criteria of the Probable Unlearnedness of a Tendency

A second question suggested by James' account of human instincts is, 'Must we, in attempting to inventory original human nature, either rely upon intuition or canvass every observed tendency and test it to see whether it is in whole or in part original? Or are there guiding principles, fundamental facts, which at once rule out whole classes of tendencies and make it very probable that other whole classes of tendencies are original?' James apparently uses his own and other men's intuitions in limiting the field for examination and uses the criteria of universality, blindness (the absence of foreknowledge of the nature or consequences of the response) and automaticity as further tests.* In the light of the work that has been done since his time of writing, the following further principles of guidance are worth notice:

1. Any tendency to behavior characteristic of mammals in general has at least some likelihood of existing originally in man. For example, the tendencies to respond to 'a large object coming toward one rapidly' by 'going away from it' and to 'a small object going away from one slowly' by 'going after it,' characteristic of many mammals, should be an object of interest to observers of children.

2. Any tendency characteristic of the primates in general except man, has some likelihood of existence in man also. For example, the fact that the monkeys respond quite differently to the situations 'object being clung to by them' and 'object holding on to them,' though the object be the same, suggests that in human behavior also the situation 'the mother' or 'a familiar person' needs further definition.

*It may be noted that neither universality, nor blindness nor automaticity is a sure test of the unlearnedness of a tendency. There is probably no original tendency to keep out of love with one known to be the child of one's mother, yet that tendency is far more nearly universal than many that are demonstrably instinctive. A person in moving his eyes as in reading a book does not know in advance how far his eyes will move, nor, as he nears the end of the line, whether they will move on or back—much less what the result will be, yet the control of eye movements in reading is surely learned. Automaticity, of course, may characterize habits which are very well learned.

3. A tendency, which, though not found in man's animal ancestors, can be shown to have been a probable result of likely variations of their original tendencies—to be in possible continuity with their instincts—has thereby an increased possibility of being instinctive. This principle is of little use in the present state of knowledge, since we do not know the exact line of our animal ancestors; nor, if we did, would we know the exact nature of their instinctive equipment.

4. Universality is not itself a proof of instinctiveness. But any widespread and easily inhibited tendency which is harmful or useless under the conditions of modern civilized life may be suspected of being original; men tend to learn unanimously only what is useful to any man and also easy to learn.

It is to be remembered that these principles are not criteria for the unlearnedness of a tendency, but only for the wisdom of testing its presence. Man has undoubtedly lost some of the original tendencies (*e. g.*, to respond to smells) characteristic of the mammals in general; he may well have never acquired, or have lost, some of the tendencies characteristic of the primates in general. Man's original nature is by no means that of an early mammal plus certain additions proper to an early primate, plus his specific contribution. There has been subtraction as well as addition. Even if the evolution of human instincts had been merely a process of addition, the criteria from ancestry could be valid only to guide observation, not to decide facts, for the sufficient reason that no one knows what the instincts of either the early mammal or the early primate were.

5. McDougall ['08] suggests that if a tendency can become abnormally exaggerated without any general mental abnormality, the tendency is probably original. "For it would seem that each instinctive disposition, being a relatively independent functional unit in the constitution of the mind, is capable of morbid hypertrophy or of becoming abnormally excitable, independently of the rest of the mental dispositions and functions." ['08, p. 49.]

The negative principles of guidance are:

6. It is unlikely that the original connections are ever between an *idea* and either another idea or a movement. No one has, I think, found satisfactory evidence that, apart from training, an idea leads of inner necessity to any one response. And there is good evidence to show that original connections are exclusively with sensory situations. In James' list, for instance, the only case where ideas are reported as the situations is the case of impersonating, or responding to the idea of an animal or object by mimicing it in action; and this case is surely doubtful. We have, of course, by original nature the capacities to connect the idea of one thing to the idea of another thing when the two have been in certain relations, and to break up the idea of a total fact into ideas of its elements, when once ideas have been given that are capable of such association and analysis. But we do not apparently, by original nature, have preformed bonds leading from ideas to anything. If an idea apart from training provokes a response, it does so by virtue of its likeness to some sensory perception or emotion. Nor do we apparently by original nature respond to a situation by any one idea rather than another. *That* we think is due to original capacity to associate and analyze, but *what* we think is due to the environmental conditions under which these capacities work.

7. It is unlikely that an object or act produced by human learning—such as a pen, a typewriter, a printed or spoken word—should provoke to any responses peculiar to it. Probably all unlearned responses to such objects are made in accordance with the law of analogy that when any situation has no response connected with it, the response made will be that connected with the situation most like it.

The school of investigators who have paid the most attention to the concrete study of man's original tendencies have often unhesitatingly assumed that man's experience with the results of his own learning has left traces of itself in his unlearned responses. To these investigators our seventh prin-

ciple will appear too strict. The justification of it against this criticism is to be made on the basis of the probability (to be discussed in Chapter XV) that the sources of original nature are not the learning of past generations but only the modifications of their germs by inner variation.

8. It is unlikely that man will have a number of responses, each limited to a sharply defined situation or group of situations, in cases where one response to some feature of many situations, will, when aided by the laws of habit, serve as well. Thus, it would be unlikely that man should be endowed with hundreds of separate tendencies to move the arm and hand in grasping, each fitted to the position of the head, position of the eyes, retinal impression, degree of accommodation and degree of convergence aroused by an object at one particular direction and distance from the eyes. For the tendency to reach vaguely, plus the tendency to alter the extent and direction of the reaching so long as the object remained untouched, plus the tendency to grasp in one way after another so long as the object remained unheld, would suffice nearly as well. In escaping from the error of leaving an instinct described only by results as 'reaching for an object seen,' or 'grasping an object touched with the finger or toes,' we must not make the opposite error of expecting nature to have provided a ready-made special outfit of reaching movements for each appropriate point of space seen, or a special outfit of grasping movements according to each part of the hand touched in each position which the hand may take.

All of these criteria of probabilities are intrinsically of slight value compared with actual observations of how, apart from training, the human animal does respond to situations. If all men, or nearly all men, did, at their first experience of a piano or anything like a piano, play 'Yankee Doodle' upon it, we should know that, in the original constitution of man's nervous system, this highly improbable connection did exist. If children, when properly tested, do not make, apart from training, two different responses to objects a foot away and

objects four feet away, we must deny the existence of an unlearned adaptation to distance, no matter how probable it seemed. But when, as is usually the case, the certainties of observed facts are lacking, these probabilities are helpful. They should be kept in mind throughout the discussions of the next nine chapters.

CHAPTER IV

Sources of Information

The special studies of unlearned tendencies in man which have been made since the publication of James's chapter on Instinct fall with few exceptions into two groups. One group comprises the direct observations of children, notably the biographies of single infants, such as those by Preyer ['81], Moore ['96], Mrs. W. S. Hall ['96, '97], Shinn ['93, '99], and G. V. N. Dearborn ['10].

In the other group are the collections of testimony about various features of human behavior made by Stanley Hall and his pupils.

THE DISCOVERY OF ORIGINAL TENDENCIES BY SYSTEMATIC OBSERVATIONS OF CHILDREN

Observers of infants have rarely so arranged the circumstances of the infant's life that his behavior in even the few most interesting cases could be surely referred to original nature on the one hand or to acquired connections on the other. They have in fact contented themselves as a rule with narrating that he did so and so at such a time. And no one of them since Preyer has attempted to inventory the unlearned tendencies manifested by infants in general or by one infant in particular.

The task of demonstrating the unlearnedness or learnedness of even a single tendency is an intricate one. To find out even approximately what the original tendency to respond is in the case of the situation, 'a garter snake seen,' it would be necessary to present that situation to children who had been carefully kept from any experience of a snake or anything like

a snake. Since the instinct might, though real, be delayed and transitory, it would be necessary to do this with many different children, some at one age, some a week or so older, some still older, and so on. Since original nature might furnish connections between 'a garter snake seen crawling toward one on the ground' and a certain response and still not connect 'a garter snake held in the hand of a familiar satisfaction-giving human intimate' with any such response, it would be necessary to define the concomitants of the 'garter snake seen' in various ways, and to experiment with each, before denying the existence of, say, an original avoiding reaction.

Moreover, the scientific biographies of infants since Preyer have been much more interested in deciding whether the behavior witnessed gave evidence of this or that conscious element than in deciding whether it was unlearned or learned.

A systematic enumeration of every statement that a tendency was unlearned or instinctive in five of the more elaborate biographies, since Preyer's, yields very meagre returns for our purpose. I shall therefore not rehearse by themselves the scattered facts about the original nature of man to be gleaned from these histories of infants. They will be used, together with such observations as I have been able to make, in the provisional inventory of instincts and capacities which will be given in the next eight chapters.

THE DISCOVERY OF ORIGINAL TENDENCIES BY A CENSUS OF OPINIONS

During the past twenty years Stanley Hall, and many students under his direction, have surveyed concrete human behavior over a wide range, summarizing the existing facts and opinions, seeking testimony by distributing printed questions, describing the gist of the testimony and adding opinions based upon it, and upon their own general experiences of human nature. The interest of these students has not been confined to the question of what in human behavior is unlearned, but that question has been prominent in the minds of the more thought-

ful and in the mind of the director of the work it has often been primary.

In subject matter these studies further encourage the hope that they will tell how human beings respond to various fundamental situations apart from learning,—what elements in their behavior are original. For among them are reports of what the responses of human beings, especially children, are to water, trees, clouds, dogs, dolls, the moon, puzzles and other important groups of situations; and of what the situations are which provoke such important responses as fear, anger, love, pity, teasing, bullying, collecting, laughter, curiosity, rivalry, and jealousy.

The value of whatever answers these studies give will depend upon the methods of collecting and treating evidence which they use. In this respect they show certain notable peculiarities. In particular, their material is, almost without exception, not direct observation, but either the answers written in reply to a printed list of questions or the papers written by school children as a school exercise in response to some question or suggestion.

I quote from one of the best known of these studies* at sufficient length to give a rough idea of the method in its more successful application.

Some of the questions asked were:

"*Growth generally.* When was growth in height or weight greatest? Was this period of growth attended by better or deranged health? Give any details, as to how much, where, how long, etc.

General Health, then and now. If imperfect, how, respecting eyes, nerves, head, stomach, etc.? Was sleep or dreams, or appetite for food affected?

Changes of Form and Feature. Did chin, nose, cheek-bone, brow, chest, hair, and other features change, and how? Was there a different facial expression? New resemblances? To whom?

Senses and Thought. Are the senses keener, wider ranged? More engrossing? Is there a change from sense to thought;

*Lancaster's 'Psychology and Pedagogy of Adolescence,' *Pedagogical Seminary*, Vol. V., pp. 61-128.

from the present to the future; the near to the far? What new *ideals*, abstract or personal?

Language. Was it harder or easier to express oneself, and was there a dumb, bound feeling? Was truth-telling harder or easier?

Future. Were careers, plans, vocations, trades, etc., dwelt upon?

Home. Did the attractiveness of home diminish, and was there a tendency to be out, go far away, strike out for self, seek new associations and friends? Should home be left part of the time?

Parents and Family. Did parental influence decline? How differently were father and mother, brother, sister, and other relatives regarded? Parental authority, punishments?

School. Was there a disposition to leave school, change studies or teachers, defy authority, or to *feel* more deeply studies, punishments and discipline?"

The author gives in every case of importance samples of the replies. For instance, from the replies to the question about careers, plans, vocations, etc., he quotes the following:

"F., 18. As a child I dreamed much of the future. Wanted to to be a musician, elocutionist, artist, milliner, bookkeeper, dressmaker and a school-teacher. Have often desired to be as beautiful in character as Christ himself.

F., 24. One of the greatest pleasures of my life has been to make plans and map out an ideal career.

F., 20. Planned to teach in my early childhood. At 13 I began to declare it, and after much discussion my wish was granted, and I began to prepare for it, to my great delight.

M., 50. Nothing is more intense and vivid than my plans for the future. One scene. A high hill with bald summit. Had been blamed for something and went to that peak. Alone there I had a very deep and never-to-be-forgotten experience. I paced back and forth and said: 'Now I will, *I WILL*, make people like me, and *I WILL* do something in the world.' I called everything to witness my vow.

F., 23. My plans for the future were all for literary fame. School aroused my ambition and for three successive years I took essay prizes.

M., 18. I look to the future. Think of myself as teaching, reading law, at the bar, in legislature, an active speaker always taking the side of right and denouncing wrong. I have had many ideals, one to be a minister.

F., 19. I often think of the future and wonder what it has in

store for me. I sometimes wish that ten years would pass in a night.

M., 19. Planned his future and painted it with the tints of the seashell.

F., 19. In mind I have planned the first day of school and gone through it many, many times. At one time I wanted to be a trained nurse. I pictured myself among the patients and how I would act in an operation. Then how I would study abroad and get a fine position."

He also discusses each topic in a general way. The following is his presentation of facts and conclusions, with reference to the attitude of adolescents toward home, parents and family:

"403 answered the question regarding home. 253—153 M., 100 F., had a desire to leave home and strike out for themselves or found home less attractive. 150—29 M., 121 F., had no desire to leave home.

107 thought that home should be left a part of the time, 20 thought it should not.

As to parents and family, 281 replied. 99—33 M., 66 F., said said parental influence did decline, while 181—35 M., 146 F., found their parents just as dear and obeyed them as readily as in childhood.

100—32 M., 68 F., felt a disposition to leave school or did leave for a while during this period. 192—98 M., 94 F., had no such feeling.

It must be borne in mind that these returns were mostly from normal school, high school, academy and college students, a majority of whom were away from home when they wrote.

75—34 M., 41 F., say that punishment was felt much more deeply. 18—9 M., 9 F., experienced no change.

This gives a very true picture of the feelings of young people toward home, school, and authority at this period of life, because the answers were given under conditions allowing free speech and favoring home, parents and school. It is a very forcible illustration of the fact that a boy or girl from 12 to 18 is fully conscious of personality and the rights of individual recognition.

This feeling that home is shut in and the desire to get away and travel, to see for oneself and form new associations, is an instinct as old as the race and common to all animal life. It is like the migratory instinct of birds. It may spring up suddenly with the most obedient and well-bred children. It is not a sign of degeneration or of less love for the home or parents. It is often associated with the most intense love of home and family.

The feeling is strongest at 16 to 18 or about the time of the final approach to maturity.

The sudden feeling of rebellion against authority, which often surprises the child as much as the parent, is another instinctive habit of the race. These crop out in the best children, sometimes with a violence that shocks everybody.

It is not necessarily a bad sign, unless frequently repeated. The desire to leave school, together with the desire to leave home, is a true and natural impulse to adjust himself to the life which he is already living in his imagination in company with his ideals.

Sympathy, not punishment, is the proper corrective."

The method is thus one of general inquiry, selection from the replies, and naive acceptance of them at their face-value. Its trustworthiness will vary with the topic, the questions, the answers, and the examiner of the answers. Some general principles, however, are sure and may guide us in estimating the worth of the method in any single case. First of all, the ignorance of a thousand people is no better than that of one; truth cannot be manufactured from constant errors by getting a great number of them. For instance, from scoring up replies to the question, 'When did your child first reason?' we do not necessarily learn anything about the date of appearance of reasoning, but only about opinions of people as to that date. From scoring up replies to the suggestion, 'Describe some miser of your acquaintance,' we attain knowledge, not necessarily of misers, but of what our correspondents notice or think they have noticed in some obvious types of miserliness. No research can ever attain a reliability beyond that possessed by the data with which it starts. And the first duty of any study of individual responses to questions or suggestions is to measure their reliability as measures of the trait in question. Adults even so well trained as college seniors and even in the simplest matters of present objective fact such as are involved in the questions, 'How tall are you?' and 'What is the circumference of your sister's head?', make gross errors. The errors increase in number and amount when the report requires memory; increase further when the fact is a report of subjective condition; and multiply like bacilli when it involves the consideration of the general drift of a series of experiences. Again, no matter

how clearly the question is put, some individuals misunderstand it. Finally, any question acts as a suggestion and with uncritical minds will surely produce affirmative answers.

There are means of avoiding many of these errors and recognizing and allowing for many of the others. But these means have not been used in the investigations under discussion. We can feel but little confidence in a method which pretends to secure truth from using at their face-value the answers of young people in normal schools to such questions as the following:

Have liberalizing theological opinions made you better or worse, and how? *Ped. Sem.*, Vol. V., p. 8.

What is your own temperament? *Ibid.*, p. 13.

Has your belief in immortality been an unfoldment of your nature or is it the result of parental influence, scriptural teaching, observation of natural phenomena, loss of friends in death, or your own inability to conceive your existence as coming to an end? *Ped. Sem.*, Vol. VI., p. 287.

What effect has [*sic*] a new overcoat, high hat, high heels, ribbons, plumes, bright-buttoned uniforms, articles of jewelry, buttons, badges, etc., upon the self-confidence, self-assertiveness and personality of the owner? *Ibid.*, p. 430.

What force and motive led you to seek a higher and better life? *Am. J. of Psy.*, Vol. VIII., p. 269.

What do you know of beggars? Their habits, laws, customs? *Ped Sem.*, Vol. VI., p. 431.

What studies have best developed your memory? *Am. J. of Psy.*, Vol. X., p. 229.

Can blood pressure be tested? *Am. J. of Psy.*, Vol. X., p. 529.

In the second place the facts reported by individuals who respond to sets of printed questions need not, and commonly will not, represent the true state of affairs in the group ostensibly studied. Psychological questionnaires are commonly sent to 'those interested' or to classes in normal schools, and answered by only a limited number of those who receive them —namely, by the individuals to whom the questions especially appeal and who have something to report, or by those who answer them as an academic task. The replies thus represent an extremely partial sampling of people in general. Moreover, of those who do reply, either from zeal or as a matter of

school work, only a small number answer all the questions. In the case of any one question, then, we get answers from very few, probably from those who have a positive or emphatic answer. We can be sure beforehand that these replies will not give a representation of the facts that really exist in the total group. Here again it would be possible to correct the bias of the replies from such a selected group by the study of fifty or a hundred individuals chosen quite at random. But this has never been done.

For instance, in the case of the study already quoted, there were received about five hundred replies from classes in normal schools, colleges and academies, and about three hundred replies from individuals. The group of students certainly does not represent the general population. How the three hundred were selected we are not told, nor what proportion they were of the total number to whom the questions were sent. There was not a single question asked in the list that was answered by all of the 787* whose replies are the basis of the article. Out of the total number for each sex the following numbers (in percentages) replied to the different questions which the author discusses.

Each number is the percentage that the number of answers to some one question was to the number replying to the questions as a whole.

Question.	Males.	Females.	Question.	Males.	Females.
1	17.0	28.9	14	11.4	11.7
2	40.2	48.9	15	29.3	41.5
3	13.2	35.5	16	15.0	22.8
4	13.2	14.8	17	49.9	77.1
5	10.3	17.5	18	97.4	97.3
6	19.9	35.2	19	85.6	68.6
7	23.6	20.7	20	105.0	77.1
8	29.1	55.4	21	63.1	63.2
9	72.7	48.0	22	74.2	54.7
10	53.4	49.6	23	81.2	64.8
11	19.9	47.5	24	72.4	61.9
12	24.6	19.3	25	44.9	51.1
13	34.7	53.9			

*The author does not even take pains to make this number clear. In one place we read, '827 (replies) have been received . . . these answers have been grouped and condensed and the results will be given' (p. 67), and two pages later we read: '341 males and 446 females answered part or all of it' (the syllabus of questions). My percentages are based on this second statement, to avoid any possibility of injustice. From the fact that one percentage thus computed is 105, I regard it as likely that the 827 is correct and that my percentages are even too large by 5 per cent.

These percentages range from 10.3 to 105 for males and from 11.7 to 97.3 for females. The averages are: Males, 44; females, 47. The variabilities (*A. D.*) are 24.7 and 16.8. There are marked sex differences in the number replying, the extremes being, women 66 per cent. as many replies as men and 269 per cent. as many. These facts demonstrate that chance is not the cause for the number of replies and failures to reply and that some real principles of selection do determine them.

It is incredible that the 85 per cent. of men who do not answer at all the question, 'Were there impulses to reform self, others, religion, state, society, etc?' had the same feelings about the matter at adolescence as the 15 per cent. who did answer, and of whom practically all (approximately 97 per cent.) say, 'Yes.' The probability indeed is that of the 85 per cent. few or none had felt such impulses to any noticeable extent and that the real affirmatives amongst the 341 males replying to the question should be reckoned at from 15 to 20 per cent. This percentage calculated from the interested and from academic students would be further reduced if mechanics, day laborers, clerks and the rest of the youth of the land were studied. The figures for the girls are of the same order of magnitude. Yet the author says: 'This feeling . . . is very characteristic of adolescence.'

I have attempted to make an estimate of the partiality of the sampling in these studies as a whole by computing from all such articles in the volumes of the *American Journal of Psychology* and *Pedagogical Seminary* from 1896 to 1900, the proportion that the number of individuals replying is of the number of individuals questioned, and the proportion that the number of answers to each question is of the numbers of individuals replying to the questionnaire as a whole. Such an estimate cannot be made because the ignorance or neglect of the fallacy of unfair selection of individuals for report has been so great that only one article in the eight volumes gives clearly the number of individuals questioned, and not even one gives full

information regarding the number of replies received to each detailed question. Some do not even give the number of individuals replying to the questions as a whole. In the one case where the number of those questioned is given, less than one sixth replied (15.67 per cent.).

In the third place, the use of replies to questions and of school compositions involves the exercise of much personal opinion as to the meaning of each report. Different individuals will differ somewhat even in their measurement of a line, will differ markedly in their estimate of the intelligence shown in any test, and would certainly differ in their rating of the replies to such complex and subtle questions as many of those on page 30, or of the school compositions on similar topics. The statements finally used to inspire conclusions are thus a compound of the actual reports and the subjective bias of the compiler. This could be avoided by the simple expedient of having several unbiased clerks go over the papers. By combining their opinions one could eliminate personal idiosyncrasies of judgment. This has not been done.

In the fourth place the progress from a set of statements about individuals to a statement about a group including them is by no means a matter of simple addition. There is a fairly complex science of mental statistics which has been found necessary to keep students out of pitfalls. Failure to take advantage of it is always a suspicious characteristic in any method of studying groups.

Conclusions about the facts studied only indirectly through the reports of incompetent observers, in the case of individuals representing a partial and undefined selection, compiled by a single and possibly prejudiced student, without the knowledge of the technique and logic of statistics, are unreliable. They may be true; they may be false; they are probably a mixture. But we cannot know how true or false they are.

In spite of these criticisms, and others whose justice President Hall and other leaders in this type of investigation would readily admit, the fact remains that we are here dealing with

reports which at least try to find out what human nature is in its rich concrete details, and which have been made by serious students under the direction of a psychologist of genius. Respect for their aim if not for their results, and for his ability if not for his method, requires due consideration for these reports. It would be futile to pass these reports by because they lack careful experimentation upon human instincts, for so do practically all others.

They have therefore been searched for observations and opinions concerning the unlearned tendencies of man. Any definite statements which they contain as to what is, in the opinion of the author in question, unlearned in human fears, sympathies, plays, behavior toward water, stones, trees, clouds, flowers and the like, will, as a rule, be quoted unless it is demonstrably based on an improper use of testimony. They will be quoted very rarely, however, for the simple reason that in all their thousands of pages there are very, very few definite statements as to what, after all, is instinctive in the behavior in question. A student reads hundreds of reports of the behavior of children toward dogs, for example, but at the end is unable to say whether children of any assigned age, apart from experience, do or do not run from, or go to, dogs.

OTHER SOURCES

Besides the biographies of children and the censuses of anecdotes and opinions made by Stanley Hall's pupils, there are observations and discussions of varying degrees of merit scattered throughout the literature of biology, psychology, anthropology, sociology and education. These have been utilized so far as I have found them. Such observations of children as have been reported by such deliberate students of original nature as James ['93], Robinson ['91, '93, '94], Cooley ['02], Kirkpatrick ['03], and McDougall ['08] are specially deserving of attention from any reader who wishes to test critically the account given in this volume.

There is a possibility that critical examination of the

reports of the behavior of primitive groups would disclose original tendencies which are masked by the artificial situations, or overgrown by the acquired habits, of more civilized life. It must be borne in mind, however, that even the most primitive races lead lives whose situations are in large measure constituted by the customs of the tribe, the presence of tools, and other products of learning, and that in many respects they early acquire habits so remote from original nature as effectually to conceal it. The sex instincts, for example, seem to be redirected by almost as elaborate a network of customs in their case as in ours. The detailed reports of travelers and field-workers I have consulted only very casually. The standard summaries of primitive man's behavior, especially any accounts of his behavior in childhood, I have examined, but with slight results in the shape of definite evidence or judgments about unlearned tendencies. I regret that I have been unable to go through the detailed reports concerning particular tribes.

The statements made about man's original tendencies in such sociological books and short reports as I have examined are rarely suitable for direct use here. The distinction between inherent and acquired traits is rarely made a prime consideration by their authors. The student of the concrete facts of human nature will, however, get many hints concerning the probable original equipment of capacities and direction of interests from the matter-of-fact sociologists. He will also enrich his general sense of human nature greatly.

The literature of animal behavior is, of course, fundamental, as a means of understanding the general features of unlearned tendencies, their place in nature, their physiological basis, and their development up to man. There will be few quotations from this literature because the original nature of man only is the present topic, but I trust that my descriptions of human instincts and capacities everywhere rest on a proper knowledge and appreciation of comparative psychology.

In spite of efforts to do full justice to what has been written on human instincts, I must frankly confess that nothing beyond

my own personal observation and reflection can be advanced to support the great majority of the statements which constitute the inventory and description of man's original nature given in the following chapters.

THE INSECURITY OF PRESENT INFORMATION

It would perhaps be wiser to abandon the effort to define man's original responses and the situations to which they are bound. There would probably be an enormous range within even expert opinion about which the original responses are to even such common situations as cats, dogs, water, fire, thunder, lightning or the dark. It is then clearly impossible to guarantee the accuracy of any inventory that anyone could now make. The facts have not been studied long enough or by careful enough methods. Moreover, as one tries to come to some conclusion about this or that tendency, he finds, as has been hinted already, almost insuperable obstacles in the artificiality of modern life, the possible transitoriness of the original tendencies, and their inhibition or immediate transformation by acquired tendencies.

A modern home in a modern community eliminates altogether many of the situations to which original human nature would probably show clean-cut responses and modifies almost all those which it does not eliminate. Civilization is to the original nature of man as a species somewhat as a European capital would be to the habits of an Eskimo. The inference from his behavior in Paris to what his ordinary life had been would be complicated and unsafe; so with the inference from what babies do in nurseries, children in schools and men in industry, sport and politics, to what their original tendencies were.

If a tendency persists over several years, as do the instincts of sex or the readiness to start, shrink and be afraid in the dark, it may show itself, at least in a distorted and complicated form. But if it passes after a brief epoch of efficiency, it may, under the conditions of modern life, never show itself

at all. Thus the tendency to climb and perch in trees seems to be original in man, but does not show itself at all universally in city children. The writer has some reason to think that retrieving is instinctive with children for a brief period in the second or third year. The fact that no one else has recorded the possibility would in this case be of little weight, for, under ordinary conditions today, possibly not one child in four has, during its brief ascendency, any chance to display it.

After the first half-year or less, original nature and nurture coöperate almost inextricably. By the time that an original tendency is ripe its situation may already have acquired bonds with other responses than those nature provides. Thus, although for many reasons it seems fairly certain that being alone in the dark is objectionable to the original nature of children from say three to eight, children of that age who have hitherto been consistently kept comfortable when alone in the dark may seem to show just the opposite.

An original tendency may also have been subdued by mere lack of exercise, or by having its exercise result in discomfort, or in some symbol for or warning of discomfort. Thus, it is almost certain that the original response toward a live chicken is, if one is hungry, to chase, capture and devour it, but it is almost equally certain that not one ten-year-old in a hundred in New York City would so respond.

An original tendency may also, though preserved in part, be amended into behavior from which it can be analyzed out only by an elaborate study of life-histories and acute inference from what experience has done to what there was at the start for experience to work on. Thus, the personal adornment and display of young people is doubtless ultimately traceable to original tendencies, but just what those tendencies comprise can be figured out only by subtracting the effects of centuries of traditional millinery, warfare, and romantic conventions.

Lack of observations of human behavior and the difficulty in interpreting the facts that have been observed which is the consequence of a civilized environment, the transitoriness of

instincts and the early incessant and intimate interaction of nature and nurture, thus baffle the cataloguer of original tendencies.

The need for an inventory of man's original nature, however, is very great. It is needed as a basis, not only for educational, but also for economic, political, ethical and religious theories. Indeed, all the sciences of human nature, from medicine to literary criticism, demand of the psychologist an accurate account of how, apart from all training, man would respond to all possible situations. The physician should know whether original nature lets a child eat too much and chew it not enough; the criminologist should know the relative shares of nature and nurture in the production of assault or theft; the statesman should know how far the efforts of men to gain wealth are rooted in an instinctive love of possession—of property as such—and how far they are caused by the love of generalized power; the student of religion inquires whether there are, apart from training, any tendencies to respond to the world-spirit.

Let it be admitted that the inventory to be given here is only a probable one,—that the writer's personal judgment, possibly his mere intuition, is often the final cause for admitting a tendency as original or excluding it as a product of learning,—and that almost every statement that will be made is more properly a question for investigation than a doctrine to be assumed true in the social control of children and men. Even so provisional an account is likely to be superior to the extravagances and superstitions in which educational theories and so-called common sense abounds. So I offer it for whatever it may be worth. For the reader's convenience this inventory of original nature will be presented for the most part dogmatically. Any adequate discussion of the evidence for and against each item of it would simply burden him in each case with a mass of observations and opinions of all degrees of relevance and merit, the sublimation of which into a definite probability would be intolerably tedious. The

reader will, I beg, remember that in spite of this dogmatic form, the statements to be made are only the best answers the writer can give to questions which science at present should perhaps ask rather than answer at all.

Finally, the inventory to be given here makes no pretence of completeness. On the contrary, it is limited definitely to the aim of giving a general sense of what may be expected of man's original nature, such as is needed to guide educational theory and practice.

CHAPTER V

Responses of Sensitivity, Attention and Gross Bodily Control

The arrangement of my inventory will be modified from that which a strictly scientific classification would suggest, so as to fit the reader's convenience, and to make connections with the treatment of instincts and capacities in present psychological literature. Ideally the arrangement should be according to some rational grouping of the situations life offers, or of the responses which men can make. I have only very roughly approximated the latter sort of arrangement, the various tendencies to connect situation and response which I list* being grouped according to the responses in question, as:—

those resulting in sensitivities
those resulting in attention
those resulting in gross bodily control
those resulting in food-getting and habitation
those resulting in fear, fighting and anger
those resulting in human intercourse
those resulting in satisfaction and discomfort
those resulting in minor bodily movements and cerebral connections
those resulting in the emotions and their expression
those resulting in consciousness, learning and remembering

*Certain events connect, apart from all training, with movements of man's body which are fully explained by mechanics or hydrostatics, such as a baby's falling when it is dropped, or being squeezed when sat upon. Such connections whereby the animal acts in the same way, whether alive or dead, will of course not be considered here. Nor will the connections of which current physiology already gives an account, such as the knee-jerk, the contraction of the pupil in bright light, the absorption of oxygen by the red blood-corpuscles, and the like.

This grouping will not be rigidly adhered to, and in at least one case, the connections leading to responses of social intercourse, the group is as truly of connections leading *from the behavior of other* human beings.

SENSORY CAPACITIES

To certain situations man responds originally by special changes in the first sensory neurones and, through these, by special changes in other neurones. He is thus affected by the situation 'a certain substance in touch with the olfactory membrane' as he is not by the situation 'that substance in touch with his fingers.' To the general pressure, absorption of heat and what not that the substance causes in both cases, there are added, in the former case, special effects, notably the excitement of certain neurones giving the sensation of smell. Well-known illustrations of original tendencies to sensitivity are the capacities to receive special impressions *via* the cones of the retina from light waves of 450 to 750 million million vibrations per second, that are not received from those of 350 million million vibrations (the infra-red); and to be influenced by air waves of 30 to 30,000 vibrations per second as one is not by air waves of 50,000 and over per second, and the like. All the remaining original tendencies hang by these tendencies to be sensitive to certain situations in ways in which a stone, a drop of water, or a potato-plant is not. Sensitivity, or impressibility, or receptivity, is the necessary preliminary to attention, approach, flight, and all other features of original intellect and character.

It must not be supposed that the neurone-action which is set up by a given stimulus in touch with a given sense-organ in a trained adult can fairly be taken as that by which he would have responded to the same situation originally. Even in sensory capacities original and eventual nature differ. The states of consciousness which vibrations of the ether of a given rate, or the air-vibrations caused by a given tuning fork, or the presence on the tip of the tongue of a tiny drop

of saturated salt-solution, and the like, provoke by their original connections are probably very unlike the states of consciousness which the trained analytical psychologist knows. The latter does not, by attending to one after another feature of the sensed world, eliminate the results of acquired connections. On the contrary, his analysis itself occurs precisely by acquiring new connections. The overtone which one hears along with the fundamental, after training in getting it separately and in listening for it in the complex, is created by forming, with a part of the stimulus, connections which that part originally lacked and so letting it produce a consciousness which it did not originally produce. The original capacities of sensation do not give us the clear sounds, colors, pressures, degrees of heat and cold, and the like, in which long experience has taught us to feel the world. To get an idea of the way the world would be sensed apart from training, we must subtract all that we know *about* it, and all the definite 'things,' 'qualities' and 'relations' which have, in the course of training, been analyzed out of the flux of gross sensations. We must take as types, the sensations which an adult psychologist gets from suffocation, heart-burn, itching or nausea rather than those which he gets from a black dot, a 100-vibration tuning fork, or a band of spectral light.

For educational theory and practice, indeed, it is often more instructive to consider what is *not* original in human sensitiveness to events than what is. That 'dead' and 'bead' are *seen* by an adult reader as they are not by the beginner; that ∴ does not *look* the same to one who cannot add or count as it does to us; that the separate tones in a chord may not be *heard* by original nature—such facts as these are the most significant results which a student of education gets from surveying sensory capacities. Just as the training of the expert musician makes him hear a symphony as the beginner does not, or as the expert tea-taster has acquired tastes which the same objects once did not give,—so training in reading, mathematics and geography makes a pupil see letters, words,

geometrical forms, magnitudes, collections, maps and photographs anew; and so the general training of infancy changes the original perceptions in response to the different vibration-rates of light, degrees of temperature, or amplitudes of sound waves.

With this caution the student is referred to the standard accounts of the physiology and psychology of the sensory capacities for details concerning what outside events are 'sensed' by man and what events in his sense-organs and associated neurones correspond to this 'sensing.'

ORIGINAL ATTENTIVENESS

Of the situations to which man is sensitive some originally excite the further responses—of disposing him, especially his sense organs and central nervous system, to be more emphatically impressed thereby—which we call responses of attention to the situations in question. Thus, he moves his head and eyes so that the light rays from a bright-colored object moving across the visual field are kept upon or near the spot of clear vision. The features which are so selected for special influence upon man vary with sex and age, but are substantially covered by the rule that man is originally attentive (1) to *sudden change and sharp contrasts* and (2) to *all the situations to which he has further tendencies to respond,* as by flight, pursuit, repulsion, play and the like.

Since, as will be seen in the following chapters, man has tendencies to respond to an enormous range of situations by visual exploration, manipulation, curiosity and experimentation, his attentiveness is omnivorous to an extent not approached by any other animals save the monkeys, and far from equalled by them. Very early the human infant devotes a large fraction of his waking hours to watching what is and happens in his neighborhood. When he gains control of reaching and grasping he examines what he can move. When he gains power to move about, he attends to almost every object that he can get to until its possibilities as a stimulus to manipula-

tion and experimentation are exhausted. In the meantime, parts of his own body and the sounds that he and the persons and things about him make have been selected from the total medleys in which they inhere by the preparation of the sense-organs, and perhaps of the neurones associated therewith, to be stimulated by this or that sight or sound or touch.

One is tempted to assert that man is originally attentive to everything until its novelty wears off. But certain notable lacks show that original attentiveness is the sum of many particular tendencies and not an indifferent general capacity. For example, man lacks the attentiveness to small differences in smells, or small intrusions of new smells into a familiar medley, which is so characteristic of many mammals.

GROSS BODILY CONTROL

How far man's management of his body in holding up his head, sitting, standing, walking, running, stooping, jumping up, jumping down, leaping at, crouching, lying down, rolling over, climbing, dodging, stooping to pick up, raising oneself again, balancing, clinging, pushing with arms and with legs, pulling with arms, and in such other movements of position, locomotion and the displacement of large objects as man has in common with the primates in general, is unlearned, is still a disputed question. Reputable opinion can be cited in support of remote extremes.

It appears to the writer that the contribution from training is slight, that these accomplishments are in origin much more like breathing, winking or sucking, than like playing tennis, dancing or swimming. The case of walking is instructive. Here, although, under the conditions of civilized family life, children appear to learn, or even to be taught, to walk, it has been shown that the appearance is illusory.* The baby's trials with varying and increasing success are not the causes of a habit, but the symptoms of a waxing instinct. The parent's

*See, for example, Kirkpatrick ['03], pp. 79-81; Trettien ['00], p. 42; Woodworth ['03], p. 315.

tuition does not create a tendency, but only stimulates or rewards it.

How easily a clear case of unlearnedness may remain unobserved is shown by the now well-known clinging reaction of the infant in the first week of life. The facts as described by Robinson, who first noted this instinct, are typical:

"Finding myself placed in a position in which material was abundant, and available for reasonable experiment, I commenced a series of systematic observations with the purpose of finding out what proportion of young infants had a noticeable power of grip, and what was the extent of the power. I have made now records of upwards of sixty cases in which the children were under a month old, and in at least half of these the experiment was tried within an hour of birth. The results as given below are, as I have already indicated, both curious and unexpected.

"In every instance, with only two exceptions, the child was able to hang on to the finger or a small stick three-quarters of an inch in diameter by its hands, like an acrobat from a horizontal bar, and sustain the whole weight of its body for at least ten seconds. In twelve cases, in infants under an hour old, half a minute passed before the grasp relaxed, and in three or four nearly a minute. When about four days old I found that the strength had increased, and that nearly all, when tried at this age, could sustain their weight for half a minute." ['91, p. 837 f.]

It must be remembered further that gradualness in appearing and imperfections in early manifestations are entirely consistent with unlearnedness. The 'perfecting' of a tendency may come from the mere inner growth that time implies as well as from exercise and tuition. Thus the reactions of running, crouching and chirring by chicks when a large object is thrown at them are surely unlearned but develop gradually. The reactions of roosters in combat are surely unlearned but are at the start so 'imperfect' that unless one traces their behavior continuously he will hardly even recognize the early manifestations. (These are that two chicks, as young even as six days, will suddenly rush at each other, face each other for

a moment and then go about their previous business.) 'Imperfection' at the start and gradualness in development are the rule rather than the exception with all original tendencies.

I judge therefore that children gain power to manage their bodies in connection with the movements listed above, as required by the ordinary exigencies of an animal-like life in the woods, largely by the inner development of original tendencies.* Just how largely cannot be said. I do not assert that man, or any of the mammals, would manage his body as well without experience as with it, or that all the gross bodily manipulations listed are as well developed by original nature as walking is. But the notion that these activities develop by trial and success and imitation wholly, or with slight assistance from some very indefinite 'predispositions,' does seem indefensible as an account of their causation in the children whom I have had opportunity to observe. The 'predispositions' can, on the contrary, be relied on to produce the behavior with a very small amount of assistance from the pains of stumbling, falling, going in the wrong direction and the like, and with no assistance at all from imitation.

Darwin long ago noted that 'everyone protects himself when falling to the ground by extending his arms' ['72, p. 31]. Moore ['96], observed that a child who had never fallen or been hurt through lack of support nevertheless clutched the person holding him when the wagon lurched or when he was lifted during sleep. A child very early changes an object from one hand to another, stoops and stands up, and the like, so far as one can see, by original coördinations. It is my prophecy that very many such original powers of bodily control will be found by proper experimentation.

*If this is the fact, the customary incitements of the nursery are largely useless and possibly harmful. So also with many of the maternal precautions against childish adventures in locomotion.

CHAPTER VI

Food Getting, Protective Responses, and Anger

FOOD GETTING

Eating.—Of the early suckling and seeking the breast, and the various original responses to objects once they are in the mouth, nothing need be said here, save that sucking movements at a sweet taste, separating the posterior portions of the tongue and palate at a bitter taste, spitting and letting drool out of the mouth at very sour, very salt, acrid, bitter, and oily objects, and turning the head to one side in rejection of food when satiated, are partial foundations of the bodily expressions of enjoyment and disgust in general.

Reaching, grasping and *putting into the mouth* deserve more consideration here because of the knowledge of the external world to which they lead. Reaching is not a single instinct, but includes at least three somewhat different responses to three very different situations. First, to the situation 'not being closely cuddled,' there is, in young infants, the tendency to respond by reaching and clutching, especially when any element of agitation is added to the situation. Second, to the situation, 'an object attended to and approximately within reaching distance,'* there is the tendency to reach, maintaining the exten-

*It has generally been assumed that man has to learn to respond appropriately to distance—that, for example, a child will reach for the moon as readily as for a similar bright object a foot or so away. But I am unable to verify this opinion. Of perhaps fifty observant parents whom I have questioned, not one could be sure that his children ever reached for the moon. The apparent cases of children reaching for objects quite out of reach seem referable to the diffuse waving of arms in excitement, the holding out of arms toward a familiar person (not to take, but to be taken), or the later pointing at objects.

sion until the object is grasped. Third, to the situation, 'an attractive object seen,' there is the tendency to reach and point at, often with the addition, as James notes, of "a peculiar sound expressive of desire."

In an environment in which household utensils and toys largely replace berry bushes and scraps of food from the family feedings, and in which regular meals are supplied according to more or less civilized customs, reaching, grasping and putting in the mouth shift largely from what is probably their primary function of preparation for, and first steps in, food getting, and blend with the general manipulation of small objects. The accompanying visual, tactile and gustatory examination of the object blends similarly with the general tendency to get experience merely for the sake of having it. The food-getting responses are thus one root of what, as physical and mental play or constructiveness and curiosity, all must recognize as main origins of intellect and skill.

Acquisition and Possession.—To any not too large object which attracts attention and does not possess repelling or frightening features the original response is approach or, if the child is within reaching distance, reaching, touching and grasping. An object having been grasped, its possession may provoke the response of putting it in the mouth, or of general manipulation, or both. The sight of another human being going for the object or busied with it strengthens the tendencies toward possession. To resistance the response is pulling and twisting the object and pushing away whoever or whatever is in touch with it. Failure to get nearer, when one has moved toward such an object of attention, and failure to grasp it when one reaches for it, provoke annoyance, more vigorous responses of the same sort as before and the neural action which produces an emotion which is the primitive form of desire.

To the situation, 'a person or animal grabbing or making off with an object which one holds or has near him as a result of recent action of the responses of acquisition,' the responses

are:—the neural action paralleling the primitive emotion of anger, a tight clutch on the object, and pushing, striking and screaming at the intruder.

Hunting.—It is not hard to show that man's original nature somehow leads to activities which justify James' inclusion of a hunting instinct. But it is hard to discover just what the hunting instinct is. It is, for instance, doubtful whether James is right in assuming the 'hunting' response toward "all living beasts, great and small," and toward "all human beings in whom we perceive a certain *intent* toward *us,* and a large number of human beings who offend us peremptorily, either by their look, or gait, or by some circumstance in their lives which we dislike." Is there perhaps, on the contrary, so specialized a tendency as that to rob birds' nests, as Schneider maintains? Just what, in any case, are the situations and the responses, referred to by the hunting instinct?

In the writer's opinion they are as follows:

To 'a small escaping object,' man, especially if hungry, responds, apart from training, by pursuit, being satisfied when he draws nearer to it. When within pouncing distance, he pounces upon it, grasping at it. If it is not seized he is annoyed. If it is seized, he examines, manipulates and dismembers it, unless some contrary tendency is brought into action by its sliminess, sting or the like. To 'an object of moderate size and not of offensive mien moving away from or past him' man originally responds much as noted above, save that in seizing the object chased, he is likely to throw himself upon it, bear it to the ground, choke and maul it until it is completely subdued, giving then a cry of triumph.

With both small and larger 'game,' there is, I think, a tendency to bring the captured animal to some familiar human being.

The responses of cautious approach, of fighting, of avoidance and of protective behavior may be mingled in all sorts of ways with the hunting responses in accordance with variations in the size of the animal, the offensiveness of its mien, and

the struggle it makes when seized, and in accordance with its alternations from flight to resistance or attack.

The presence of this tendency in man's nature under the conditions of civilized life gets him little food and much trouble. There being no wild animals to pursue, catch and torment into submission or death, household pets, young and timid children, or even aunts, governesses or nurse-maids, if sufficiently yielding, provoke the responses from the young. The older indulge the propensity at great cost of time and money in hunting beasts, or at still greater cost of manhood in hounding Quakers, abolitionists, Jews, Chinamen, scabs, prophets, or suffragettes of the non-militant variety. Teasing, bullying, cruelty, are thus in part the results of one of nature's means of providing self and family with food: and what grew up as a pillar of human self-support has become so extravagant a luxury as to be almost a vice.

Possible Specialized Tendencies.—It is possible that tendencies to seek particular objects as food and to capture them by specialized sets of movements may also be original in man. Thus Schneider ['82] thinks that bird's nests and eggs are situations of particular potency to attract attention and possession, and Acher ['10] seems to think that throwing stones, hitting with a club, and cutting with pointed objects are responses apart from learning. It has been asserted that there is a special instinct to insert the fingers into crannies (to dislodge small animals hidden there)! There is some evidence to show that a small object held out or tossed to a young human is more readily seized and tasted than one otherwise encountered, and that he will eat food that he himself picks up more readily than the same food when put in his mouth by another.

*Collecting and Hoarding.**—There is originally a blind tendency to take portable objects which attract attention, and

*These tendencies are listed here rather than in the miscellaneous group because far back in the animal series they probably developed in connection with the food-getting tendencies, though in man today and in some other animals the connection is perhaps entirely absent.

carry them to one's habitation. There is the further response of satisfaction at contemplating and fingering them there. These tendencies commonly crystallize into habits of collecting and storing certain sorts of objects whose possession has additional advantages, and abort as responses to other objects whose possession brings secondary annoyances. Thus, money, marbles, strings, shells, cigar-tags and picture-postals become favored objects by their power in exchange, convenience of carriage, permanent attractiveness and utility in play.* But clear evidences of the original tendency may remain, as in those who feel a craving to gather objects which they know will be a nuisance to them or who cannot bear to diminish hoards which serve no purpose save that of being a hoard. So of the man who stole utensils from his own kitchen to increase his hoard, and bought substitutes!

Avoidance and Repulsion.—To the situations, 'bitter and oily things in the mouth, slimy, wriggling and creeping things on one's flesh, the sight and smell of putrid flesh, excrement and entrails,' there are original tendencies to respond respectively by spitting out and retching, jumping back or shrinking or shuddering, and turning away, and in common by the neural action which produces feelings of disgust.

Rivalry and Coöperation.—Instinctive rivalry and coöperation in food-getting and pugnacity when dispossessed will be noted amongst the instincts of social intercourse.

HABITATION

James' description of the original satisfyingness of having something fairly close over one's head and behind one's back when resting deserves quotation in full:

"There can be no doubt that the instinct to seek a sheltered nook, open on only one side, into which he may retire and be safe, is in man quite as specific as the instinct of birds to build a nest. It is not necessarily in the shape of a shelter from wet

*For an instructive account of the results of the instinct under the conditions of modern life, see C. F. Burk ['00], The Collecting Instinct, *Pedagogical Seminary*, vol. 7, pp. 179-207.

and cold that the need comes before him, but he feels less *exposed* and more at home when not altogether unenclosed than when lying all abroad. . . . Habits of the most complicated kind are reared upon it. But even in the midst of these habits we see the blind instinct cropping out; as, for example, in the fact that we feign a shelter by backing up beds in rooms with their heads against the wall, and never lying in them the other way. . . . The first habitations were caves and leafy grottoes, bettered by the hands; and we see children today, when playing in wild places, take the greatest delight in discovering and appropriating such retreats and 'playing house' there." ['93, vol. 2, pp. 426 ff.]

It is an instructive experiment to compare the behavior of children to a blanket hung over two chairs, with their behavior toward the same chairs put *on* the blanket; or to compare one's own hesitation between the rational hygiene which keeps beds out of alcoves and the instinctive impulse to put them just there.

Responses to Confinement.—Being shut up completely within a small and especially a strange enclosure, on the other hand, probably calls forth instinctive discomfort and screaming in the very young, and pulling, pushing and kicking at the barriers, in those older.

Migration and Domesticity.—Kline ['98] believes in the unlearnedness of the migratory tendency, but not in its universality. He quotes, as evidence, many cases where the satisfaction of change of surroundings—of being in motion from the old to the unknown—was gratified at the sacrifice of many rationally more attractive goods,* and also cases of sheer blind

*Says Flynt: "I have known men on the road who were tramping purely and simply because they loved to tramp. They had no appetite for liquor or tobacco, so far as I could find, also were quite out of touch with criminals and their habits; but somehow or other they could not conquer that passion for roving. In a way this type of vagabond is the most pitiful that I have ever known; and yet is the truest type of the genuine voluntary vagrant. . . . To reform him it is necessary to kill his personality, to take away his ambition—and this is a task almost superhuman. Even when he is reformed he is a most cast down person." [Josiah Flynt, '85, quoted by Kline, '98, p. 3.]

impulsive running away from the familiar surroundings. On the other hand, as he admits and emphasizes, homesickness or dissatisfaction at change of surroundings, at the absence of familiar objects or persons or both seems equally unlearned and uncalculating.

It is probable that to the situation, 'the long familiar physical and social environment' there may be in original nature two opposite tendencies, to be content and remain and to be annoyed and depart, other conditions in the person deciding which shall predominate. Old age, femaleness and physical weakness, for example, seem to favor the former response; adolescence, maleness and energy seem to favor the latter.

Both tendencies certainly can be shown by the same individual. The case would thus be like, and probably one manifestation of, the instinctive interest in the objects associated with one's life, one's house, possessions, friends and the like, combating the equally instinctive interest in novelty and adventure. In certain individuals one or the other original tendency may be specially strong so as to counterbalance the other satisfactions and discomforts of the case, but for the great majority the attractiveness of the familiar is determined far more by what it has *gone with* than by its mere familiarity, and the call of the unknown is chiefly in terms, not of its mere novelty, but of its promise of other specific satisfactions. It is important to note that even Dr. Kline finds that home is cherished in large measure because of the kindness of parents compared with strangers, because one's customary habits are not interfered with, and because of freedom for one's individuality. Home is left in large measure because of injury (real or fancied) received from parents, because of loneliness, and because one's new desires are interfered with. That is, in large measure home is cherished or abandoned for just the same reasons. The same response occurs to the same element whether found in the home or outside it.

Consequently the unlearned tendencies to respond to *mere* home and *mere* absence, even if real, are of little consequence.

So far as migration keeps other things equal and affords more new interesting experiences, it has the advantage of stronger appeal to the love of physical and mental activity. This, more than a mere wanderlust for wandering's own sake, is probably the cause of the widespread fascination of travel.

FEAR

Fear is an original tendency that has been much studied* and may profitably be described here in enough detail to serve as a sample of some of the difficulties in the task of distinguishing what is original in human behavior.

It is customary for writers about human nature to use the word fear as if it meant a well-known fact about whose description there would be no more disagreement than about length or breadth, or, at least, than about nose-bleed or hunger. That this is far from being true is clear from the answers from persons of probably superior intelligence and knowledge to Stanley Hall's set of questions ['97, p. 148 f.] about fear. Some interpret fear as unpleasant expectation; some, as dread; some, as anxiety; some, as worry; some, as dislike; some, as avoidance; some, as shock or consternation; some, as flight; some, as paralysis. The following quotations from the answers illustrate the variety of inner affections and outer behavior which the word fear signifies:—

Unpleasant expectation and dread.

"She is always fearing that meteors will drop on her."

Anxiety and worry.

"Has a chronic fear that her father is to die; although he is well, she fancies all the details, and suffers over and over as much as if it were real."

*Its bodily expressions have been described at length by Darwin ['72] and others; Mosso [English translation of fifth edition in '96] has written a book entitled *Fear,* though much of it concerns emotional expression in general; and Stanley Hall ['97] has filled a hundred pages with descriptions and explanations of the commonest fears of childhood and adult life.

"Suffers from the constant fear of losing the points of the compass."

Dislike and avoidance.

"Could not bring herself to touch another's teeth."

"A young man could not board in the house with a young lady because she worked in an undertaker's factory."

"Never can look on the parts of animals in the physiology class."

"Feared the bureau where an uncle kept his glass eye."

Shock.

"Starts at every little thing twenty times a day; her heart leaps to her throat."

Flight, paralysis and other forms of behavior.

"The sight of a mouse always gives her hysteria."

"Every time the wind whistled or made any kind of noise would run to his mother's lap."

"Used to fall in panic at shadow."

"Sweats and cannot move in a thunder-shower."

"Always shudders when looking at clouds."

"Can enter a dark place with composure, but the moment she turns her back to come out she has the horrors, must generally run, and sometimes scream."

"Is dizzy, cramped and nauseated at green worms."

"Shows his horror of touching fur by putting both hands behind him and spitting vigorously."

From such facts it appears that, while each writer may know definitely what he means by fear (though I think not), it is almost certain that not all writers will mean the same thing, and it is absolutely certain that not all their readers will. Description, explanation and practical precepts for the control of fear should, so far as may be, replace the vague single word by an objective account of actual responses. This I shall try to do.

The more easily observable responses are:—

Withdrawal of attention from everything save the exciting situation

Running from the exciting object
Running to cover
Running to a familiar human animal
Crouching under something
Crouching behind something
Clutching
Clinging
Nestling
Starting—*i. e.*, a sudden tension of the muscles in general
Remaining stock-still, semi-paralyzed
Falling down
A screaming cry
Turning the head
Covering the head
Covering the eyes
Shuddering
Shivering
Trembling
Opening the mouth wide
Opening the eyes wide
Raising the eyebrows
Temporary cessation of breathing
Temporary cessation of heart-beat
Acceleration of breathing
Acceleration of heart-beat
Increased intensity of heart-beat
Difficulty in breathing and paleness, due to the contraction of the smooth muscles of the lungs and of the small arteries in the skin
Sweating
Diminished action of the salivary glands
Erection of the hair

Less easily observable, and as yet undefined, responses are the changes within the nervous system that produce the subjective features* whereby a man could report that he had

*Some of the experts in telling what a man's conscious states are

felt fear, though he had no knowledge that he had responded in any of the ways hitherto listed.

The antagonistic or exclusive responses in the above list may occur in response to the same situation, but in sequence. Thus one may remain stock-still for a moment, then run and then crouch behind something; or may have the heart stop and then beat faster and harder.

The clutching, clinging and nestling are, as might be expected, specially prominent in early infancy, but persist to some degree throughout life. Running to a familiar human animal and a screaming cry are also relatively more prominent in infancy and early childhood, but also persist.

It is obvious that not all of these responses will be made to any one situation on any one occasion, though a sufficiently exciting stimulus will bring forth a majority of them. If Aeneas "stood stock-still, his hair bristled, his voice stuck in his throat," he doubtless also shuddered, grew pale, opened wide his eyes and mouth, raised his eyebrows. He may have displayed many more of these responses.

What now are the situations which originally provoke these responses severally or certain common combinations of them? It must be at once confessed that we do not know, for if we did we should not find three competent students of human nature reporting,—one that "fears of thunder . . . reptiles and insects are probably merely transmitted from one generation to another by social heredity" (by which is meant not heredity at all, but its opposite—education) and that "probably the only specialized fear that is instinctive is that excited by the danger-call of parents" [Kirkpatrick, '03, pp. 103 and 101]; another that by our original organization, "*Strange men,* and *strange animals,* either large or small, ex-

made of would compound the subjective features of fear out of the sights, sounds, etc., from the situation, *plus* unpleasantness; others would add to the sensations and unpleasantness, a feeling of tension; others would add further a feeling of depression (or possibly of excitement). It is not necessary to our purpose to decide between the rival theories of the inner aspect of fear.

cite fear, but especially men or animals advancing toward us in a threatening way. . . . The great source of terror to infancy is solitude. . . . *Black things,* and especially *dark places, holes, caverns,* etc., arouse a peculiarly gruesome fear. . . . A human corpse seems normally to produce an instinctive dread" [James, '93, vol. 2, pp. 417-420, *passim*]; and another [McDougall, '08, p. 49] that what we respond to by flight is "danger!"

Thunder and lightning, reptiles, wild and domestic animals,* darkness, and strange persons were most frequently reported as the objects of fear in response to Stanley Hall's questions ['97]. These five covered over a third of all the reports, numbering 603, 483, 474, 432 and 436 out of the total of 6456. Fire, death, disease and robbers, which, on grounds of learning alone, should probably be more feared than the five mentioned, were reported only 365, 299, 241 and 153 times. Moreover the fear in the latter case is far more often the response of dread or anxiety or mere precaution *lest* the house catch fire, *lest* one die or become ill, *lest* thieves break in and steal, the situations being other than fire, death, disease or robbery themselves. In the former case, the fear reported is the thoroughgoing agitation when in presence of the object itself. Miss Miles ['95] asked a hundred students and teachers at Wellesley College, "What things were you afraid of as a child?" getting replies as follows:—"31 feared darkness; 31 feared animals. Dogs and cows were mentioned most often . . . ; 24 feared (or felt repulsion toward) snakes, spiders, worms, mice, cats, etc.; 18 feared human beings—drunken, dead, insane, strange, tramps and rude boys; 9 feared imaginary evils." Robinson, who reports actual experiments, is convinced of the originality of fear at the approach of a large, noisy, shaggy object. He writes:—

"In connection with this subject we may consider the remarkable terror which is exhibited by most children of under two years old on seeing anything which resembles a wild

*Not including, apparently, insects or rats and mice, which were reported 203 and 196 times.

beast. This is quite independent of the most elementary knowledge of natural history, and still more so of any acquired information as to possible danger from such a source. I have experimented on my own little ones, and on others, in order to find out what crawling shape they deemed most frightful. This, I thought, might give one a hint of the most prevalent source of danger to children in that prehistoric epoch during which human nature was being slowly shaped and moulded out of the beast-nature of The Thing of the Tree. My modus operandi consisted of covering myself (always in full sight of the child) with a shaggy skin, and then imitating the actions and voices of various dangerous creatures such as the wolf, lion, bear, or dog. These experiments were followed up by showing the children the stuffed specimens of such beasts in the Kensington Natural History Museum. Although they had no knowledge, either practical or otherwise, of the formidable character of animals of such a kind (and also in spite of the fact that the fraud was a patent one), the children all exhibited great agitation and distress whenever the pseudo bear or wolf drew near; so much so, in fact, that the 'new game' had to be speedily relinquished in most instances." ['94, p. 476 f.]

Sully ['96] thinks that the "facts are strongly opposed to the theory of an inherited fear of animals" [p. 209] and that "it is by no means certain that" the fear of being alone in the dark is instinctive. [p. 212] But the evidence which he summons hardly justifies the first of these statements and leaves the main arguments in favor of an instinctive response to loneliness and the dark undisturbed.

On the whole, it seems likely that an unlearned tendency exists to respond by the physical and mental condition known as fear to the situations, 'thunder-storm,'* 'reptiles,' 'large animals approaching one,' 'certain vermin,' 'darkness' and 'strange persons of unfriendly mien.'

It is highly probable also that some noises, other than thunder, excite some of the responses on our list. McDougall,

*Mr. H. M. Stanley ['98] has suggested that the essential feature of the situation is not the flash or noise, but the electro-magnetic disturbance itself.

who is in general very timid about stating any concrete particulars that originally excite fear, admits that "in most young children unmistakable fear is provoked by any sudden loud noise . . . and all through life such noise remains for many of us the surest and most frequent excitant" (of fear). ['08, p. 51.] It is indeed the case that, in the biographies of infants, noises and strange persons are more frequently mentioned as the situations causing fear than are all other objects together.* This extreme emphasis is, however, in large measure due to the fact that modern civilized life produces many harsh, piercing and sudden noises, and eliminates wild animals.

We may ask further whether certain *particular* qualities of noise do not have a fear-exciting effect beyond that of their suddenness and intensity. Does, for instance, an equally loud and sudden merry 'Hello' excite the same response as a dog's growl or the wind's howl? I think not, but am unable to give important evidence of the specialized effects of equally sudden and loud noises.

'The great source of terror to infancy is solitude,' says James, and many of us can testify to the existence of, at least, a greater readiness to be frightened by other features of a situation when solitude is one feature, and to the apparent unlearnedness of this tendency. On the other hand, it will be argued that experience is adequate, since so large a portion of the sufferings of life come upon a child when he is alone. It is then that he falls out of his crib, is attacked by dogs or other children, and the like; and, when we are older, it is then that fancy conjures up possible dangers and miseries.

These contra-arguments are weaker than they seem. Infants who are fed with absolute regularity, and who are never left alone in circumstances which permit injury from loneliness, nevertheless will, when they are alone, start and scream at objects and events that would cause no such response in the mother's presence. Many observers who deny that soli-

*See Preyer ['82], Perez ['88], Moore ['96], Shinn ['99], Hall ['96, '97]. See also Gard ['08] on strange sounds as a cause of shock.

tude provokes fear would agree that the mother's presence lessens it. But that is really to assert the same thing. The sensitiveness of imagination to frightening ideas in solitude is a result rather than a cause of fear. Being alone, we grow fearsome; growing fearsome, we think of events in harmony with our fearsomeness.

What Kirkpatrick, who denies specialized instinctive fears, says of darkness may be said of solitude also—that it "is a condition in which fear may readily be excited." ['03, p. 101.] But this is to admit that solitude does have a tendency to produce the fear responses. What causes any response to a total situation, is that much of the situation, which, if altered, alters the response. If a man has a stronger original tendency to tremble, and the like, when the wind howls around him in his loneliness than when he hears the same howling in company, then the loneliness as well as the howling is fear-producing.

In all such cases—of fear or of any other responses—it is unscientific to draw a sharp line between the major, or more essential, and the minor, or less essential, features of a situation. Darkness, solitude and suddenness should be thought of ultimately just as thunder or reptiles. To state that we respond by X to thunder, responding more vigorously or surely when alone, is to state absolutely the same fact as that we respond by X to loneliness, responding to it more vigorously or surely when there is thunder. Absolutely the same fact may be described truthfully by saying that we fear X, fearing it more when Y also occurs; or that we fear Y, fearing it more when X also occurs.

I do not think that the situation of being on a high place, as a bridge, tree-top or precipice edge, provokes by original nature any characteristic complex of the responses of our list. In Stanley Hall's replies, the disagreeableness of the situation seems to be due oftenest to intellectual apprehensions—first, that one may give way to the 'impulse to jump off,' and second that something may give way. The 'impulse to jump off' is utterly unlike 'fear at being there,' and the idea that something

may give way is a product of training. Children have to be vigorously cautioned *against* climbing trees, going too near edges and the like; the passion for being up in the air as in swings, on hilltops and the like, is very strong; the modern building-trades seem free from any considerable handicap, in spite of the dizzy perching which they involve; finally, the actual sensations of those who go up in the air in ships seem charming rather than frightful.

What James calls 'fear of the supernatural' ['93, p. 419] and what McDougall refers to in saying that "in some of the more timid creatures it would seem that every unfamiliar sound or sight is capable of exciting fear" ['08, p. 51], offer interesting problems for analysis. Strangeness of certain sorts, for example, the 'vertiginous baffling of the expectation,' certainly provokes the fear responses. Strangeness of other sorts or in other contexts provokes a mere caution; of other sorts, curious examination; of other sorts, delighted contemplation; of other sorts, indifference. Which sorts in which circumstances produce which responses—nobody has dared to state. Daily life offers amusing proofs of our ignorance. The parent buys a toy, prophesying that its novelty will lead to delighted contemplation, but finds that it produces 'turning the head away, clinging, trembling and screaming.' The teacher shows a rare specimen to secure curious examination, but gets only indifference. The practical joker with elaborate care arranges an exhibit to excite paralysis and flight, but his young brother only cautiously approaches and demolishes it.

I may venture a few suggestions to aid in solving this question, though we must in the end rely upon special observations and experiments. First, strangeness *per se* causes shock. The amount of shock will depend in part on the amount of strangeness, and in part on the condition of the person. What gives the mild shock of surprise in health may give the grave shock of fear in illness. The amount of shock will also depend in part on the kind of strangeness. Strange men and animals (and moving objects, it may be added) more often

provoke fear, strange tastes and smells more often provoke mere discomfort, strange motionless objects, such as toys, flowers or furniture, more often curiosity.

It is strange that there should be in the literature on fear no emphatic mention of the power of 'being suddenly brushed or clutched' to arouse the fear responses, especially in women and children. I venture to assert that nine-tenths of females (and of males under 15) when they were alone in the dark would, if something brushed by them or gripped throat, arm or leg, show pronounced responses, in spite of the fact that no harm had ever been done them as the result of similar sensations. In older males the fear responses might persist, or be mixed with, or give way to, those of fighting.

Since the responses and the situations provoking them which are involved in what men call instinctive fear are both so numerous, there should be, in an account of original nature, a section telling just which of the responses are bound to each of the situations, and how firmly. As yet this has not been done, or even attempted.

Surely, however, the sciences of human nature cannot rest content with the fact that by original nature strange men and animals advancing toward us with threatening mien, thunder and lightning, reptiles, darkness, solitude, dark holes and corners, rats, spiders and other creeping things, sudden noises, contacts and clutches unprepared for tend to produce more or less an indeterminate assortment of discomfort, running, crouching, screaming, clinging, trembling, and so on. They need to know just what the effect of each of these situation-elements is. Practically, it makes a great difference whether a man responds only with discomfort, palpitations and the inner subjective fear, still shooting at the enemy, or also runs and hides. Theoretically, it makes a great difference whether the situations involved are regarded as producing indiscriminately a vague X, fear, which then may at random produce any assortment of its various 'expressions,' or are

regarded as each producing, under the same conditions, an effect proper to it and to nothing but it. In the latter case we are encouraged to study the exact details of human behavior in fear, tho we may never know them, while in the former case we are told beforehand that they are unknowable.

As a sample of such inquiries, let us ask whether each of the situations tends equally to provoke each of the responses and in the same degree, so that one or another, or one after another, and more or less of it, will come according to accidental physiological conditions in the animal. Surely not. The 'fear' due to a large animal coming toward one rapidly is not the same as the 'fear' due to thunder and lightning. The large animal is much more likely to be responded to by running than by hiding. With thunder and lightning the reverse is true. Still surer is the specialization of the intensity of the response. One can vary the amount of a child's 'starting' from a contraction hardly perceptible up to one approaching a convulsion, by varying the stimulus. Can anyone doubt that each degree of loneliness or suddenness has a determinate effect?

Consider the specialized effects of solitude, of sounds compared with sights, and of seeing a large animal approaching one rapidly compared with grasping a cold clammy reptile. In my opinion at least, the clutching, clinging and nestling responses are relatively rare in solitude, tho occasionally a human being, so frightened, will clutch at trees or even at nothing. Fearful sounds rarely provoke turning the head away and covering the eyes, but fearful sights often do. A large animal approaching one rapidly and distant, say, forty feet, is often responded to by turning and running, but very rarely by jumping backwards. The reverse is true of the response to the same animal met suddenly at a distance of three feet, or to a clutch (from in front) in the dark.

It is probable further that an impartial survey of human behavior, unprejudiced by the superstition that a magic state of consciousness, 'fear,' is aroused by 'danger,' and then creates flight and other symptoms of itself, would show that pursuit

and capture may produce distinctive responses whether or no the peculiar inner trepidation which introspection knows is present. A large object coming rapidly toward one seems often to provoke instinctive turning, fleeing, seeking cover (and the human horde, if that is present) without necessarily doing more. Being pounced on or grasped by a large object seems often to be responded to by instinctive dodging, writhing and pulling, without anything that deserves the name of the inner emotion of fear.

FIGHTING

Fighting and anger might be listed under the original tendencies of social intercourse, since the situations concerned are so often produced by other human beings. They might go under tendencies of gross bodily manipulation. They might go along with the peculiarly 'expressive' tendencies. They might, even more scientifically, be separated into different behavior-series and reported under several of our headings. I list them together and here simply as a matter of convenience to the student.

Pugnacity and anger are usually coupled together (for example, by James ['93, vol. 2, p. 409 f.] and by McDougall ['08, p. 59 f.]) as the external and internal aspects of the same response. But the facts of original nature are hardly so simple. Pugnacious behavior or fighting and angry behavior are both complexes, which need to be analyzed and which are by no means proved to be inseparable in man's original equipment. There seem, indeed, to be at least six separable sets of connections in the so-called 'fighting instinct.'* These are:—

(1) To the situation, 'being interfered with in any bodily movements which the individual is impelled by its own constitution to make, the interference consisting in holding the individual,' the little child makes instinctively responses of stiffening, writhing and throwing back the head and shoulders.

*There is a still different set or sets for the tendencies most usefully called instinctive anger.

These are supplemented or replaced by kicking, pushing, slapping, scratching and biting in the older. This tendency, if it exists, may be called the instinct of *escape from restraint.*

(2) To a similar situation, with the difference that the interference is by getting in the way or shoving, the responses are:—dodging around, pushing with hands or body, hitting, pulling and (though, I think, much less often) slapping, kicking and biting. This may be called the instinct of *overcoming a moving obstacle.*

Parents who are scientific observers will admit the existence and unlearnedness of these two tendencies, and, I think, will by close observation find that they are fairly distinguishable one from the other, and both from the forms of anger and fighting whose description follows. The angry behavior in these two cases usually ceases when the confinement or obstruction ceases, and rarely leads to more violent behavior thereafter, whereas in some other cases it is maintained and may arouse the hunting instinct, teasing, bullying and cruelty after its own immediate end has been attained.

(3) To the situation 'being seized, slapped, chased or bitten (by any object), the escape-movements having been ineffective or inhibited for any reason,' the fighting movements or the paralysis of terror may be the response. When the former occurs, the total complex may be called the instinct of *counter-attack.*

To the particular situations that arise when attack provokes counter-attack, there are, I believe, particular responses. If A clings to B, trying to throw him down or bite him, B will, by original nature, more often try to push A away or throw him down than to hit or bite him. If A rushes at B, slapping, scratching and kicking, B will, by original nature, more often hit and kick at A than try to push him away or throw him down. I believe that there is a basis in original nature for the distinction in sport between the fight with fists, which I judge to be a refinement (inappropriate as the word may seem) of

the 'slap-scratch-poke' fighting, and the wrestling match, which I judge to be a refinement of the 'push-pull-throw down-jump upon' fighting. When A and B are both down, the response is an effort to get on top. When A is beaten, it is originally satisfying to B to sit on him (or it), to stand exulting beside him (or it), and to remain unsatisfied (if A is a human being) until A has given signs of general submissiveness. Many other specialized original tendencies, such as to remove things from different parts of the body in different ways, and to duck the head and lift up the arm, bent at the elbow, in response to the situation, 'an object coming toward the head rapidly,' appear in the course of a fight.

(4) To the situation 'sudden pain' the response is attack upon any moving object near at hand. This may be called the instinct of *irrational response to pain.* This fact, common in everyone's experience, may of course be interpreted as an acquired habit of response by analogy, but it seems to the writer that it is a true and beautiful case of nature's very vague, imperfect adaptations, which only on the whole and in a state of nature are useful. When a loving child with indigestion beats its mother who is trying to rock it to sleep (though it would protest still more if not rocked), or when a benevolent master punches the servant who is lifting his gouty foot, the contrary habits seem too strong to be overcome by the force of mere analogy with an acquired habit of hitting in response to the pain of conflict. Indeed the existence of the latter habit is in such cases only a matter of speculation.

(5) To the situation, 'an animal of the same species toward whom one has not taken the attitude of submission and who does not take it toward him' the human male responds by threatening movements, shoving the person away, and, if these fail to produce the attitude of submission, by either submission or further attack. The encounter is closed by the submission of either party, which may take place at any point. This tendency may be called the instinct of *combat in rivalry.*

Dr. Ordahl ['08] has given some interesting evidence of

the prevalence of this tendency in mammals in general. The following episode from Tom Sawyer may serve to clothe my abstract formulation in flesh and blood:—

"Neither boy spoke. If one moved, the other moved—but only sidewise, in a circle; they kept face to face and eye to eye all the time. Finally Tom said:

"I can lick you!"

"I'd like to see you try it."

"Well, I can do it."

"No, you can't either."

"Yes I can."

"No you can't."

"I can."

"You can't."

"Can!"

"Can't!"

An uncomfortable pause. Then Tom said:

"What's your name?"

" 'Tisn't any business of yours, maybe."

"Well, I 'low I'll make it my business."

"Well, why don't you?"

"If you say much, I will."

"Much—much—much. There now."

"Oh, you think you're mighty smart, don't you? I could lick you with one hand tied behind me, if I wanted to."

"Well, why don't you do it? You say you can do it."

"Well, I will, if you fool with me."

"Oh yes,—I've seen whole families in the same fix."

"Smarty! You think you're some, now, don't you? Oh, what a hat!"

"You can lump that hat if you don't like it. I dare you to knock it off—and anybody that'll take a dare will suck eggs."

"You're a liar!"

"You're another."

"You're a fighting liar and dasn't take it up."

"Aw—take a walk!"

"Say—if you give me much more of your sass I'll take and bounce a rock off'n your head."

"Oh, of course you will."

"Well, I will."

"Well, why don't you do it then? What do you keep say-

ing you will for? Why don't you do it? It's because you're afraid."

"I ain't afraid."

"You are."

"I ain't."

"You are."

Another pause, and more eyeing and sidling around each other. Presently they were shoulder to shoulder.

Tom said:

"Get away from here!"

"Go away yourself!"

"I won't."

"I won't either."

So they stood, each with a foot placed at an angle as a brace, and both shoving with might and main, and glowering at each other with hate. But neither could get an advantage. After struggling till both were hot and flushed, each relaxed his strain with watchful caution, and Tom said:

"You're a coward and a pup. I'll tell my big brother on you, and he can thrash you with his little finger, and I'll make him do it, too."

"What do I care for your big brother? I've got a brother that's bigger than he is—and what's more, he can throw him over that fence, too." (Both brothers were imaginary.)

"That's a lie."

"Your saying so don't make it so."

Tom drew a line in the dust with his big toe, and said:

"I dare you to step over that, and I'll lick you till you can't stand up. Anybody that'll take a dare will steal sheep."

The new boy stepped over promptly, and said:

"Now you said you'd do it, now let's see you do it."

"Don't you crowd me now; you better look out."

"Well, you said you'd do it—why don't you do it?"

"By jingo! for two cents I will do it."

The new boy took two broad coppers out of his pocket and held them out with derision. Tom struck them to the ground. In an instant both boys were rolling and tumbling in the dirt, gripped together like cats; and for the space of a minute they tugged and tore at each other's hair and clothes, punched and scratched each other's noses, and covered themselves with dust and glory. Presently the confusion took form and through

the fog of battle Tom appeared, seated astride the new boy, and pounding him with his fists.

"Holler 'nuff!" said he.

The boy only struggled to free himself. He was crying, —mainly from rage.

"Holler 'nuff!"—and the pounding went on.

At last the stranger got out a smothered " 'nuff!" and Tom let him up and said:

"Now that'll learn you. Better look out who you're fooling with next time."

(6) To the situation, 'the mere presence of a male of the same species during acts of courtship,' the human male tends to respond by threatening or attacking movements until the intruder is driven away or the disturbed one himself flees.

I am less confident of the existence of this than of any of the other specializations of the fighting tendency, but on the whole cannot conquer the suspicion that mere presence without other provocation does arouse resentment in other males engaged in courtship as it would not otherwise, and that the disappearance of the intruder rather than his submission is the satisfying condition in this case much more than in others.

(7) Either as habits of analogy developing from these specialized tendencies, or as an equally original but vaguer tendency in addition to them, the following behavior occurs:—

To the situation—being for some length of time thwarted in any instinctive response by any thing, especially if the thwarting continues after one has done various things to evade it, the response-group of pushing, kicking, hitting, etc., is made, the attack continuing until the situation is so altered as to produce instinctively other responses, such as fulfilling the original activity, hunting, mangling, triumphing over, or fleeing from, the thwarting thing.

I shall not attempt to decide whether this general tendency to angry behavior of some sort at the persistent thwarting of any instinctive response is itself acquired or original, or to present evidence either way. It is probably wisest for practical control to assume that it is original. McDougall assumes not

only that it is original but that it is the *only* original tendency, that there is no difference in the response whether the one thwarted is trying to sit up, to run to a given point, to console an infant, to curiously examine a machine, to get food into his mouth, to win a submissive gaze from another boy, or to diminish pain, that what I have listed as six or more differentiated tendencies is one indistinguishable 'expression' of 'anger.' A blow he says arouses angry behavior because "the impulse of self-assertion" is thwarted. ['08, p. 60.] The instinct of pugnacity, in his opinion, "has no specific object or objects. . . . The condition of its excitement is rather any opposition to the free exercise of any impulse, any obstruction to the activity to which the creature is impelled by any one of the other instincts. And its impulse is to break down any such obstruction and to destroy whatever offers this opposition." ['08, p. 59 f.]

Kirkpatrick says, somewhat more concretely, that "anything interfering with the child's activities or wishes" produces "crying, turning away the head, pushing away an offending object, . . . kicking and striking . . . . stamping with the feet or striking the head against the floor." ['03, p. 104.] Such behavior is possibly the foundation of all the later variations. Perez ['82, p. 75] is right in maintaining that the beginnings of such behavior come very early in life, though perhaps not in the third month, as he states.

The case of a child held against his will would then be typical of all pugnacious behavior. He first wriggles, pulls, turns, or drops to the floor; he then pushes, kicks, and strikes, progressing perhaps to biting, butting, and the miscellany of rage in case the thwarting continues.

This inclusion of all varieties of angry behavior or fighting movements in one general tendency to respond to obstruction, and their description merely by their effect in breaking down the obstruction and destroying whatever offers it, I have tried to show is a too easy account of the facts. But it is a great step in advance of no definite statement at all as to what origin-

ally makes man angry or what man originally does in that condition.

Stanley Hall would criticize both it and my account as hopelessly inadequate to the rich variety of original nature, but would be, I think, misled by the emphasis put upon eccentricities rather than ordinary occurrences by his correspondents and their confusion of dislike and intolerance generally with pugnacity.

The state of affairs, angry and pugnacious behavior, is apparently satisfying. Of course, some of the situations that provoke it are far from satisfying intrinsically, but the responses made to them *are,* and often are enough so to make one rather seek than avoid the situation itself. The misery reported in connection with anger seems to be an after-effect, the accompaniment of shame, grief, or rational deprecation of one's past behavior, or of the exhaustion due to it.

The flushing, snarling, flashing eyes, violent heart-beat and the less easily observable internal activities which we call the feeling of anger by no means always appear in response to the seven sets of situations listed above. The separation is clearest in defensive fighting, whose inner bodily accompaniments may be those of fear, but is observable elsewhere. Fighting in the strict sense and anger in the strict sense go together, not always and of necessity, because they are mystically born together in one instinct, but often and by the contingency that a situation is such as arouses fighting by one combination of its elements and anger by another combination.

My description of instinctive fighting, I may add, is confessedly imperfect. The truth will, when found, carry the reduction of 'pugnacity' to much fuller detail, specifying just what sort of counter-blows, scratches, kicks, shoves, buttings and the like are connected with each concrete provocative element in the various attacks from and attitudes of objects.

ANGER

The older view was that a certain single state of mind existed called *'anger,'* that this was aroused by many situations and that it expressed itself in many bodily responses.

Stanley Hall ['99] mentions, as instinctive causes of anger in this sense, some thirty physical features, a score of peculiar acts, an equal number of features of dress, a multitude of habits, limitation of the subject's freedom, the thwarting of his expectation or purpose, contradiction, invasion or repression of his self, injuries to pride, injustice, causes of jealousy, and many special circumstances. The responses as described by Darwin are as follows:—

"Rage.—I have already had occasion to treat of this emotion in the third chapter, when discussing the direct influence of the excited sensorium on the body, in combination with the effects of habitually associated actions. Rage exhibits itself in the most diversified manner. The heart and circulation are always affected; the face reddens or becomes purple, with the veins on the forehead and neck distended. The reddening of the skin has been observed with the copper-coloured Indians of South America, and even, as it is said, on the white cicatrices left by old wounds on negroes. Monkeys also redden from passion. With one of my own infants, under four months old, I repeatedly observed that the first symptom of an approaching passion was the rushing of the blood into his bare scalp. On the other hand, the action of the heart is sometimes so much impeded by great rage, that the countenance becomes pallid or livid, and not a few men with heart-disease have dropped down dead under this powerful emotion.

The respiration is likewise affected; the chest heaves, and the dilated nostrils quiver. As Tennyson writes, "sharp breaths of anger puffed her fairy nostrils out." Hence we have such expressions as "breathing out vengeance," and "fuming with anger."

The excited brain gives strength to the muscles, and at the same time energy to the will. The body is commonly held erect ready for instant action, but sometimes it is bent forward towards the offending person, with the limbs more or less rigid. The mouth is generally closed with firmness, showing fixed

determination and the teeth are clenched or ground together. Such gestures as the raising of the arms, with the fists clenched, as if to strike the offender, are common. Few men in a great passion, and telling someone to begone, can resist acting as if they intended to strike or push the man violently away. The desire, indeed, to strike often becomes so intolerably strong, that inanimate objects are struck or dashed to the ground; but the gestures frequently become altogether purposeless or frantic. Young children, when in a violent rage roll on the ground on their backs or bellies, screaming, kicking, scratching, or biting everything within reach. So it is, as I hear from Mr. Scott, with Hindoo children; and as we have seen, with the young of the anthropomorphous apes.

But the muscular system is often affected in a wholly different way; for trembling is a frequent consequence of extreme rage. The paralyzed lips then refuse to obey the will, "and the voice sticks in the throat;" or it is rendered loud, harsh, and discordant. If there be much and rapid speaking, the mouth froths. The hair sometimes bristles; but I shall return to the subject in another chapter, when I treat of the mingled emotions of rage and terror. There is in most cases a strongly-marked frown on the forehead; for this follows from the sense of anything displeasing or difficult, together with concentration of mind. But sometimes the brow, instead of being much contracted and lowered, remains smooth, with the glaring eyes kept widely open. The eyes are always bright, or may, as Homer expresses it, glisten with fire. They are sometimes bloodshot, and are said to protrude from their sockets—the result, no doubt, of the head being gorged with blood, as shown by the veins being distended. According to Gratiolet, the pupils are always contracted in rage, and I hear from Dr. Crichton Browne that this is the case in the fierce delirium of meningitis; but the movements of the iris under the influence of the different emotions is a very obscure subject. . . .

Shakespeare sums up the chief characteristics of rage as follows:—

> "In peace there's nothing so becomes a man,
> As modest stillness and humility;
> But when the blast of war blows in our ears,
> Then imitate the action of the tiger:
> Stiffen the sinews, summon up the blood,
> Then lend the eye a terrible aspect;

> Now set the teeth, and stretch the nostril wide,
> Hold hard the breath, and bend up every spirit
> To his full height! On, on, you noblest English."
> Henry V., Act III. sc. 1.

The lips are sometimes protruded during rage in a manner, the meaning of which I do not understand, unless it depends on our descent from some ape-like animal. Instances have been observed, not only with Europeans, but with the Australians and Hindoos. The lips, however, are much more commonly retracted, the grinning or clenched teeth being thus exposed. This has been noticed by almost everyone who has written on expression. The appearance is as if the teeth were uncovered, ready for seizing or tearing an enemy, though there may be no intention of acting in this manner. Mr. Dyson Lacy has seen this grinning expression with the Australians, when quarrelling, and so has Gaika with the Kaffirs of South America. Dickens, in speaking of an atrocious murderer who had just been caught, and was surrounded by a furious mob, describes "the people as jumping up one behind another, snarling with their teeth, and making at him like wild beasts." Everyone who has had much to do with young children must have seen how naturally they take to biting, when in a passion. It seems as instinctive in them as in young crocodiles, who snap their little jaws as soon as they emerge from the egg." ['72, pp. 238-242.]

We may add, as very probably instinctive, the flow of tears, spitting,* yelling, scratching, kicking and slapping, by adults as well as children, pulling, shaking the objects attended to at the time, stamping, jumping up and down, and hitting with the hand.

The way man originally feels as he responds to the appropriate situations by escaping restraint, overcoming a moving obstacle, counter-attack, irrational response to pain, combat in rivalry, expelling intruders, and in struggling against thwarting in general, I shall not attempt to describe in the conventional way.

That there is some common likeness in the internal responses

*See Schneider ['80, p. 225 ff.] for descriptions of this and some other forms of angry behavior and their homologues in the mammals in general.

of man's neurones to the various so-called anger-provoking situations, and consequently in the man's feelings, is indubitable. Just as there is an identical element in the internal responses of man's neurones to very intense sounds, whatever their pitch or timbre, whereby he in each case has a 'loudness' sensation, so there is some common feature in his internal cerebral responses to many different external situations, whereby he in each case has a resentment-anger-rage emotion. And just as we can, in more or less useful ways, describe the 'loudness,' as by contrasting it with 'lowness' or comparing it with a bright light or heavy weight, so we can describe the inner, subjective 'anger' by its differences from love or its likeness to intense joy. But such descriptions are of little value. A more useful definition of the common element in angry feelings is *'the internal response of consciousness in a man which is provoked by such and such definable conditions outside and inside him,'* just as the most useful description of 'loudness' is *'the internal response of consciousness in a man, which is provoked by a certain outside condition—air vibrations of large amplitude in his neighborhood—and a certain inside condition—a normal ear and brain.'*

LIBRARY WASHINGTON COLLEGE CHESTERTOWN MD

To the questions, 'How does a man originally feel as he responds to sound air vibrations of great amplitude?' and 'How does a man originally feel as he responds to blows, intrusion, being thwarted and the like?' there is, in each case, ultimately no more useful answer than *'As he does feel.'* This answer may in some cases be reached indirectly by first analysing the situation into its elements, stating how he would feel in response to each element, and stating his total feeling as a resultant of the compound of elements; but, first or last, the essence of an objective, matter-of-fact 'description' of a purely mental state has to be the naming of the situation which provokes it and the creature in whom it is provoked.

An objective description of the condition in the neurones of the brain which parallels this common element of feeling would, of course, be of great value. We should, for example,

then see the mechanism whereby, in the course of training, such different situations as 'a blow in the face,' 'being stared at insolently,' 'having one's hat blow off,' 'hearing a pupil say "He ain't,"' and 'seeing a badly-painted picture,' all arouse similar responses. For such an objective description knowledge is lacking.

What I have written concerning the common conscious element of angry behavior applies equally to the conscious elements of fear, affection, self-assertion and all the other instinctive emotions. Henceforth, then, I shall dispense with statements about such conscious elements and about the hidden, internal, neural responses which parallel them. Certain general problems concerning them will be reviewed in Chapter XI.

CHAPTER VII

Responses to the Behavior of Other Human Beings

MOTHERLY BEHAVIOR

Human intercourse and institutions are as surely rooted and grounded in original nature as man's struggles with the rest of nature for food and safety. The first, and all in all the greatest, social bond and condition is the original behavior of mother to young.

All women possess originally, from early childhood to death, some interest in human babies, and a responsiveness to the instinctive looks, calls, gestures and cries of infancy and childhood, being satisfied by childish gurglings, smiles and affectionate gestures, and moved to instinctive comforting acts by childish signs of pain, grief and misery. Brutal habits may destroy, or competing habits overgrow, or the lack of exercise weaken, these tendencies, but they are none the less as original as any fact in human nature

With the changes in the woman's nature and life that conception and child-birth bring, these tendencies gain new power and special attachments. To a woman who has given birth to a child, a baby to see and hold and suckle is perhaps the most potent satisfaction life can offer, its loss the cause of saddest yearning. To a woman who has given birth to a child, the baby she sees, holds and nurses appeals almost irresistibly when it gives the cry of hunger, pain or distress, the start of surprise, the scream of fear, the smiles of comfort, the cooing and gurgling and shouting of vocal play. She cuddles it when it cries, smiles when it smiles, fondles and coos to it in turn. As the first human face it sees and turns to follow, as the familiar form which it nestles against in comfort and clutches in fear, she

wins its tokens of affection. When it later points at objects, she looks and shares its interest. And later still, every signal of joy, or grief, or pain by this being whom she has held and nursed and fondled, has its quick response. In all this, original nature is the prime mover and essential continuing force.

This series of situations and responses constitutes the 'maternal instinct' in its most typical form. But, as do all original tendencies, it acts somehow, though its ordinary situations be complicated or deformed. To have given birth to a child, though ordinarily an enormous intensifier of maternal care, is not a *sine qua non*. The sequence may, though less surely, begin with holding and nursing. Similarly, suckling the child, though ordinarily an enormous intensifier of maternal care, may be absent but still leave the situation potent enough to arouse the later sequences. So childless women, who lack also the stimuli of care of early infancy, may yet manifest the later tendencies toward the children they adopt.

The added stimuli of bearing and nursing children may occasionally decrease the general womanly benevolence and protectiveness toward children and all creatures and things that simulate the appeal of dependence on a mother's care. When they do so, it is by restricting the responses concerned to a particular object in a fetichistic way. But I am confident that in general motherhood increases general tenderness.

Boys and men share more in the instinctive good will toward children than traditional opinion would admit, though the tendencies are not so strong, and the responses are different. Very weak in the specific tendencies to clasp and carry an infant (the proverbial distress and awkwardness of the male when an infant is thrust into his arms, as contrasted with the typical woman's 'Let me hold him,' is at bottom instinctive) and to fondle and prattle to it, and lacking also the special incitement of the tendency due to the inner changes of child-birth and lactation, they yet in their own way respond to many of its appeals. To offer a little child scraps of food and see it eat, to snatch it from peril by animals, and to smile approvingly at

its more vigorous antics, seem to me to be truly original tendencies of the human male. Kirkpatrick notes ['03, p. 119] that children "seek the protection of any human being, if frightened by an animal." They usually get it.

Ratzel, writing of primitive man, says: "Motherly love is so natural a sentiment that the modes of expressing it need no authentication; but we often come across instances of tenderness on the father's part toward his offspring. No doubt there are cases of cruelty, but these are exceptions. All who have gone deeply into the question agree in praising the peaceful and kindly way in which those of one household live together among uncorrupted natural races." ['85-'88, Eng. transl. of '96, Vol. 1, p. 122, from 2d German edition of '94-'95.]

Westermarck says: "The parents' duty of taking care of their offspring is, in the first place, based on the sentiment of parental affection. That the maternal sentiment is universal in mankind is a fact too generally admitted to need demonstration; not so the father's love of his children. Savage men are commonly supposed to be very indifferent towards their offspring; but a detailed study of facts leads us to a different conclusion. It appears that, among the lower races, the paternal sentiment is hardly less universal than the maternal, although it is probably never so strong and in many cases distinctly feeble. But more often it displays itself with considerable intensity even among the rudest savages. In the often-quoted case of the Patagonian chief who, in a moment of passion, dashed his little son with the utmost violence against the rocks because he let a basket of eggs which the father handed to him fall down, we have only an instance of savage impetuosity. The same father 'would, at any other time, have been the most daring, the most enduring, and the most self-devoted' in the support and defence of his child. Similarly the Central Australian natives, in fits of sudden passion, when hardly knowing what they do, sometimes treat a child with great severity; but as a rule, to which there are very few exceptions, they are kind and considerate to their children, the men as well as the women carrying them when they get tired on the march, and always seeing that they get a good share of any food. All authorities agree that the Australian Black is affectionate to his children. "From observation of various tribes in far distant parts of Australia," says Mr. Howitt, "I can assert confidently that love

for their children is a marked feature in the aboriginal character. I cannot recollect having ever seen a parent beat or cruelly use a child; and a short road to the good will of the parent is, as amongst us, by noticing and admiring their children. No greater grief could be exhibited, by the fondest parents in the most civilised community at the death of some little child, than that which I have seen exhibited in an Australian native camp, not only by the immediate parents, but by the whole related group." Other representatives of the lowest savagery, as the Veddahs and Fuegians, are likewise described as tender parents. Though few people have acquired a worse reputation for cruelty than the Fijians, even the greatest censurer of their character admits that the exhibition of parental love among them "is sometimes such as to be worthy of admiration"; whilst, according to another authority, "it is truly touching to see how parents are attached to their children." The Bangala of the Upper Congo, "swayed one moment by a thirst for blood and indulging in the most horrible orgies, . . . may yet the next be found approaching their homes looking forward with the liveliest interest to the caresses of their wives and children. Carver asserts that he never saw among any other people greater proof of parental or filial tenderness than among the North American Naudowessies. Among the Point Barrow Eskimo "the affection of parents for their children is extreme"; and the same seems to be the case among the Eskimo in general. Concerning the Aleuts Veniaminof wrote long ago:— "The children are often well fed and satisfied, while the parents almost perish with hunger. The daintiest morsel, the best dress, is always kept for them." Mr. Hooper, again, found parental love nowhere more strongly exemplified than among the Chukchi; "the natives absolutely dote upon their children." Innumerable facts might indeed be quoted to prove that parental affection is not a late product of civilisation, but a normal feature of the savage mind as it is known to us.

When dealing with the origin of the altruistic sentiment we shall find reason to believe that paternal affection not only prevails among existing men, savage and civilised, but that it belonged to the human race from the very beginning." ['06, '08, vol. 1, pp. 529-532.]

Male thoughtlessness and brutality toward children, and whatever living being or thing makes a similar appeal, is due

not to total absence of kindliness, but rather to the presence of the competing tendencies of the hunting instinct, which is as much stronger in men than in women as the maternal instinct is stronger in women than in men.

Filial Behavior.—Original nature, careless of equity, provides no filial instinct of return devotion. The nearest approach to it is the tendency of the young to follow after, appeal to, and take a submissive attitude toward, certain of their own species. These responses the mother earns if she gets them at all. They more often attach themselves to an older brother or sister, to the less loving but more exciting father, or to a dominant playmate. Stable boys, policemen, the well-dressed teacher, or the female relative in a higher station of life, may rob the mother of the little that nature under better auspices might allow her. One must be a mother for motherhood's sake. Assurance of instinctive filial devotion would perhaps be better gained by the demands which a commanding behavior issues than by the sacrifices of motherly love.

RESPONSES TO THE PRESENCE, APPROVAL AND SCORN OF MEN

Gregariousness.—Man responds to the absence of human beings by discomfort, and to their presence by a positive satisfaction. Kidd's statement about Kafir children holds true of man in general. In his games and work, too, "there is much that looks like sheer animal love for gregarious fellowship." ['06, p. 298.]* To be alone is as James says ['93, vol. 2, p.

*Kidd says elsewhere: "The black child is sociable from infancy, and it is very rare to find a boy or girl who loves to sit alone and to brood in silence, or to wander off in solitude. Occasionally a child seems devoid of social tendencies, and in that case a witch-doctor is sent for to cure the child. But if any definite anti-social tendencies were to manifest themselves, the child would find but scant leniency in his treatment; such a quality would be promptly squashed in the interests of the life of the clan. As a matter of fact it is rarely manifested except in those natives who have been in contact with civilization. According to Kafir thought non-sociability is one thing, which is but abnormal; anti-sociability is quite another thing, for it is the vilest of evils, and is considered

430] one of the greatest of evils for him, so that solitary confinement is regarded as a cruel torture. Restlessness and, I think, wandering about, are further original responses to isolation. The rich satisfaction of the presence of a single companion consists not only in allowing various desirable activities which need a fellowman as their stimulus, but also in the mere fact that he is there. Being one of a crowd adds new instinctive exhilarations, irrespective of any particular benefits the situation may be expected to produce. McDougall and James have both emphasized the part this tendency plays in our recreations. The former says:

"In civilized communities we may see evidence of the operation of this instinct on every hand. For all but a few exceptional, and generally highly cultivated, persons the one essential condition of recreation is the being one of a crowd. The normal daily recreation of the population of our towns is to go out in the evening and to walk up and down the streets in which the throng is densest—the Strand, Oxford Street, or the Old Kent Road; and the smallest occasion—a foreign prince driving to a railway station or a Lord Mayor's Show—will line the streets for hours with many thousands whose interest in the prince or the show alone would hardly lead them to take a dozen steps out of their way. On their few short holidays the working classes rush together from town and country alike to those resorts in which they are assured of the presence of a large mass of their fellows. It is the same instinct working on a slightly higher plane that brings tens of thousands to the cricket and football grounds on half-holidays. Crowds of this sort exert a great fascination and afford a more complete satisfaction to the gregarious instinct than the mere aimless aggregations of the streets, because all their members are simultaneously concerned with the same objects, all are moved by the same emotions, all shout and applaud together. It would be absurd to suppose that it is merely the individuals' interest in the game that brings these huge crowds together. What proportion of the ten thousand witnesses of a football match

monstrous. It is safe to say that sociability is one of the first qualities to be developed in a black child, and grows throughout life. The Kafir's love for the social life of the kraal is far stronger than even the undergraduate's love of the social life in the college courts." ['06, p. 119 f.]

would stand for an hour or more in the wind and rain, if each man were isolated from the rest of the crowd and saw only the players?

Even cultured minds are not immune to the fascination of the herd. Who has not felt it as he has stood at the Mansion House crossing or walked down Cheapside? How few prefer at nightfall the lonely Thames Embankment, full of mysterious poetry as the barges sweep slowly onward with the flood-tide, to the garish crowded Strand a hundred yards away! We cultivated persons usually say to ourselves, when we yield to this fascination, that we are taking an intelligent interest in the life of the people. But such intellectual interest plays but a small part, and beneath works the powerful impulse of this ancient instinct.

The possession of this instinct, even in great strength, does not necessarily imply sociability of temperament. Many a man leads in London a most solitary, unsociable life, who yet would find it hard to live far away from the thronged city. Such men are like Mr. Galton's oxen, unsociable but gregarious: and they illustrate the fact that sociability, although it has the gregarious instinct at its foundation, is a more complex, more highly developed, tendency. As an element of this more complex tendency to sociability, the instinct largely determines the form of the recreations of even the cultured classes, and is the root of no small part of the pleasure we find in attendance at the theatre, at concerts, lectures, and all such entertainments. How much more satisfying is a good play if one sits in a well-filled theatre than if half the seats are empty; especially if the house is unanimous and loud in the expression of its feelings! [McDougall, '08, pp. 86-87.]

James says of the universal human love of festivities, ceremonies and the like, "There is another sort of human play, into which higher aesthetic feelings enter. I refer to that love of festivities, ceremonies, ordeals, etc., which seems to be universal in our species. The lowest savages have their dances, more or less formally conducted. The various religions have their solemn rites and exercises and civic and military power symbolize their grandeur by processions and celebrations of diverse sorts. We have our operas and parties and masquerades. An element common to all these ceremonial games, as they may be called, is the excitement of concerted action as one of an organized crowd. The same acts, performed with a

crowd, seem to mean vastly more than when performed alone. A walk with the people on a holiday afternoon, an excursion to drink beer or coffee at a popular 'resort,' or an ordinary ball room, are examples of this. Not only are we amused at seeing so many strangers, but there is a distinct stimulation at feeling our share in their collective life. The perception of them is the stimulus and our reaction upon it is our tendency to join them and do what they are doing and our unwillingness to be the first to leave off and go home alone." ['93, vol. 2, p. 428.]

A similar argument could be made in the case of our religious worship, the organization of schools, the preference of young women for factory labor over domestic service, and almost any other human activity.

Responses of Attention to Human Beings.—Man has a special original interest in the behavior of other men. Doubtless this, in infancy, is largely due to the mere variety in movement which human beings have in common with dogs, mechanical toys, the leaves of trees and the like. But it is hardly wholly due thereto. The human face is too early singled out from other objects and too constantly a controller of attention. Chamberlain hardly exaggerates when he says that "the face of its elders is the child's chart and compass in the first voyages of life." ['00, p. 189.] Evidence is found in the difference between the sexes in respect to it. If measurements are taken of the strength of the interest in the intellectual and moral traits of people compared to the strength of the interest in the mechanical operations of things, women differ notably from men. It seems necessary, therefore, to admit that the specific form and features and characteristic behavior of man, as in smiling, crying, or jabbering, attract attention to him and what he does.

Attention-getting.—There seems to be, though one cannot be sure, a real, though easily counteracted, tendency to respond to the presence of an inoffensive human being by approaching, gesticulating, calling, and general restless annoyance until he notices one. A man entering a room where another stands absorbed will often, in spite of the conventions of cityfied habits,

feel a measurable irritation, walk past him, ring for a waiter, or the like, though he would not have felt and done so, had the room been empty. Children seem to act in this way irrespective both of any acquired intention to win approval, and of the more aggressive behavior which we call self-assertiveness or display.

Responses to Approving and to Scornful Behavior.—To the situation, 'intimate approval, as by smiles, pats, admission to companionship and the like, from one to whom he has the inner response of submissiveness,' and to the situation, 'humble approval, as by admiring glances, from anybody,' man responds originally by great satisfaction. The withdrawal of approving intercourse by masters and looks of scorn and derision from anyone originally provoke a discomfort that may strengthen to utter wretchedness.

The reader will understand that the approval and disapproval which are thus satisfying and annoying to the natural man are far from identical, in either case, with the behavior which proceeds from cultivated moral approbation and condemnation. The sickly frown of a Sunday-school teacher at her scholar's mischief may be prepotently an attention to him rather than the others, may contain a semi-envious recognition of him as a force to be reckoned with, and may even reveal a lurking admiration for his deviltry. It then will be instinctively accepted as approval.

Darwin long ago noted the extraordinarily ill proportioned misery that comes from committing some blunder in society whereat people involuntarily 'look down' on one for an instant. Except for him, little attention has been paid to the originality of the hunger of man for the externals of admiration and the intolerability of objective scorn and derision. Yet these forces of approval and disapproval in appropriate form from those above and those below us in mastery-status, are and have been potent social controls. For example the 'discipline' of a humane home or school today relies almost entirely upon such approval from above, and finds it even more effective than

severe sensuous pains and deprivations. The elaborate paraphernalia and rites of fashion in clothes exist chiefly by virtue of their value as means of securing diffuse notice and approval. The primitive sex display is now a minor cause: women obviously dress for other women's eyes. Much the same is true of subservience to fashions in furniture, food, manners, morals and religion. The institution of tipping, which began perhaps in kindliness and was fostered by economic self-interest, is now well-nigh impregnable because no man is brave enough to withstand the scorn of a line of lackeys whom he heartily despises, or of a few onlookers whom he will never see again.

Best of all illustrations of the potent craving for objective approval, perhaps, is offered by Veblen's brilliant analysis of the economic activities of the leisure class.* These he finds to be essentially vicarious consumption and conspicuous waste, or the maintenance of a useless retinue and public prodigality in order to show that you have more than you can use, and so to fix upon you the admiring glances of those who can afford to waste less or nothing at all.

Responses by Approving and Scornful Behavior.—To manifest approving and disapproving behavior is as original a tendency as to be satisfied and annoyed by them. Smiles, respectful stares and encouraging shouts occur, I think, as instinctive responses to relief from hunger, rescue from fear, gorgeous display, instinctive acts of strength and daring, victory, and other impressive instinctive behavior that is harmless to the onlooker. Similarly, frowns, hoots and sneers seem bound as original responses to the observation of empty-handedness, deformity, physical meanness, pusillanimity, and defect. As in the case of all original tendencies, such behavior is early complicated, and in the end much distorted, by training; but the resulting total cannot be explained by nurture alone.

In this I may be wrong, for two very gifted students of the social instincts assert:—the one, that approval and disapproval

*Thorstein Veblen, *The Theory of the Leisure Class*, '99.

as responses have no specific original roots [McDougall, '08, p. 217 f.]; and the other, that responses to approving and disapproving facial expressions as situations are "apparently learned much as other things. . . . The child comes in time to associate the wrinkles that form a smile with pleasant experiences—fondling, coaxing, offering of playthings or of the bottle, and so on" [Cooley, '02, p. 64]. But Professor McDougall's opinion might be explained by the fact that, having in mind judgments of approval and disapproval of the sophisticated moral sort, and finding no two single primary emotions corresponding to them, he assumes that there are no two original lines of behavior on the basis of which these judgments may later be formed. Now, the absence of primary emotions of approval and disapproval does not prevent the presence of original tendencies to scowl and smile beyond those explained by the instincts of pugnacity and maternal affection. Cooley's inference I simply cannot accept. He admits, as everyone must, that facial expressions are *made* instinctively; and that is one of the best of reasons for expecting them to be *responded to* instinctively. Also I doubt whether parents habitually smile at children when they give them food and toys and other indulgences; they smile oftener when they do not have to give such,—when the infant placidly kicks up his legs, or smiles, or says ah-goo, or displays his repertory of tricks. Apart from probabilities my observations lead me to believe that, though secondary to the voice and to gross bodily attitudes and gestures, facial expressions instinctively made are instinctively responded to. Cooley, it may be added, might accept all of the account given here, save the use of facial expression. He himself notes "as early as the fourth month a 'hurt' way of crying which seemed to indicate a sense of personal slight. It was quite different from the cry of pain or anger, but seemed about the same as the cry of fright. The slightest tone of reproof would produce it. On the other hand, if people took notice and laughed and encouraged she was hilarious." ['02, p. 116 f.]

MASTERING AND SUBMISSIVE BEHAVIOR

There is, I believe, an original tendency to respond to 'the presence of a human being who notices one, but without approving or submissive behavior' by holding the head up and a little forward, staring at him or not looking at him at all, or alternating staring and ignoring, doing whatever one is doing somewhat more rapidly and energetically and making displays of activity, and by satisfaction if the person looks on without interference or scorn. There is a further tendency to go up to such an unprotesting human being, increasing the erection and projection of the head, looking him in the eye, and perhaps nudging or shoving him. There is also an original tendency to feel satisfaction at the appearance and continuance of submissive behavior on the part of the human beings one meets. These tendencies we may call the instinct of *attempt at mastery*. Such behavior is much commoner in the male than in the female. In her the forward thrust of the head, the approach, displays of strength, nudging and shoving are also commonly replaced by facial expressions and other less gross movements.

If the human being who answers these tendencies assumes a submissive behavior, in essence a lowering of head and shoulders, wavering glance, absence of all preparations for attack, general weakening of muscle tonus, and hesitancy in movement, the movements of attempt at mastery become modified into attempts at the more obvious swagger, strut and glare of triumph. The submissive attitude may also provoke the master to protect the submissive one. If the human being protests by thrusting *his* head up and out, glaring back, and not giving way to advance, the aggressor either becomes submissive or there is more or less of a conflict of looks, gestures, yells, or actual attacks, until, as was described under the fighting instinct, the submission of one or the exhaustion of both.

There is an original tendency to respond to the situation, 'the presence of a human being larger than oneself, of angry or mastering aspect,' and to blows and restraint, by submissive

behavior. When weak from wounds, sickness or fatigue, the tendency is stronger. The man who is bigger, who can outyell and outstare us, who can hit us without our hitting him, and who can keep us from moving, does originally extort a crestfallen, abashed physique and mind. Women in general are thus by original nature submissive to men in general. Submissive behavior is apparently not annoying when assumed as the instinctive response to its natural stimulus. Indeed, it is perhaps a common satisfier.

Every human being thus tends by original nature to arrive at a status of mastery or submission toward every other human being, and even under the more intelligent customs of civilized life somewhat of the tendency persists in many men.

The original behavior in mastery and submission, and in approving, disapproving, being approved and being scorned, derided and neglected, becomes very much complicated by differences in the sex of the person who is the situation, and in the sex and maturity of the person who is responding, by an increase in the number of persons who are the situation, and by the presence in the situation of elements provocative of curiosity, fear, anger, repugnance, the hunting instinct, kindliness, sexual attraction and coy behavior. My account of attempt at mastery, for instance, would be only partly true of any cases save those where the situation and the response were the behaviors of two males of about the same degree of physical maturity. Mastery and submission are fit illustrations of the universal fact that the many unit tendencies to respond to characteristic situations combine in elaborately complex totals. This fact makes the original social tendencies of man seem, at first sight, like a hopelessly unpredictable muddle of domineering, subservience, notice, disregard, sex pursuit, aversion, showing off, shyness, fear, confidence, cruelty and kindness. , It also makes such unit-tendencies as I have described under approval, scorn, mastery and submission seem abstract and schematic, as indeed, they are.

Space is lacking in this book, and knowledge in its author,

to trace in the bewildering complexes of human intercourse, the combined effect of the unit-tendencies which I have outlined. We may be confident, however, that, did we know enough, we should find that whether a person will in a given case be shy, or indulge in display, or alternate between the two —whether he will domineer or plead in courtship—whether he will respond toward a given child by approval, domineering, bullying, protection, hunting or fondling—could in every case be prophesied from knowledge of the situation and of him.

Two such problems may be taken as sample tasks. When, we may ask, will mere display or showing off, without further behavior toward mastery, be the response, and when will shyness? Can we do better with these two problems than to note that display is characteristic of the male human being when attracted by a female, and that there is "a certain amount of purely instinctive perturbation and restraint due to the consciousness that we have become objects for other people's eyes"? [James, '93, vol. 2, p. 432.]

Display.—Consider what should happen to mastering behavior in the male if the condition of the one responding, or of the situation to which he responds, possesses elements which inhibit the proud look and threatening approach. Will not the tendency appear in the mutilated form of display alone? Now, to be sexually attracted would, by arousing another form of approach in the responder, inhibit his threats. If the situation were not one human being but many, it would, by arousing readiness to retreat, have a similar effect. Again, if the situation were a much more mature person, one larger and more impressive, but by his encouraging looks not provocative of submissive behavior, the tendency toward mastering behavior would be retained as display alone. The hypothesis that instinctive showing off is what is left of mastering behavior when certain parts of it are kept out seems likely, since it accounts so well for the three main sets of circumstances under which this mild form of self-assertion occurs.

Shyness.—In the second problem, we are required to find

out what original shyness is, as well as when it occurs. It seems to consist chiefly in hesitancy and restraint of movement (most easily noticed in speech), lowering of eyes, and averted face. I suggest, therefore, that it may be submissive behavior *minus the gross bodily cringing, and the inner acceptance of subserviency,* and that it occurs as what is left of the response of submissive behavior when the condition of the person responding, or of the situation to which he responds, possesses elements which inhibit these. Thus, where a powerful and hostile crowd would provoke submission *in toto,* a *mere* crowd or a fairly friendly crowd provokes shyness, and the speaker simply cannot look at them quite squarely or speak naturally. Similarly, while a sufficiently domineering mistress may provoke submission *in toto,* the ordinary nice girl makes her admirers simply shy. Similarly, the adult whose behavior, if fully masterful, would provoke submission *in toto,* by omitting certain features of his mastering behavior reduces its effect upon others to shyness.

Instead of the various forms of original tendencies which have been here described under mastery, submission, responses to admiration and responses to scorn, McDougall would assume two tendencies, "The instincts of self-abasement (or subjection) and of self assertion (or self-display)" ['08, p. 62]. He says:—

"The instinct of self-display is manifested by many of the higher social or gregarious animals, especially perhaps, though not only, at the time of mating. Perhaps among mammals the horse displays it most clearly. The muscles of all parts are strongly innervated, the creature holds himself erect, his neck is arched, his tail lifted, his motions become superfluously vigorous and extensive, he lifts his hoofs high in air, as he parades before the eyes of his fellows. . . . The instinct is essentially a social one, and is only brought into play by the presence of spectators. Such self-display is popularly recognized as implying pride; we say "How proud he looks!" . . . It is this primary emotion which may be called positive self-feeling or elation, and which might well be called pride, if that word were not required to denote the sentiment of pride. In the

simple form in which it is expressed by the self-display of animals, it does not necessarily imply self-consciousness.

Many children clearly exhibit this instinct of self-display; before they can walk or talk the impulse finds its satisfaction in the admiring gaze and plaudits of the family circle as each new acquirement is practised; a little later it is still more clearly expressed by the frequently repeated command, "See me do this," or "See how well I can do so-and-so"; and for many a child half the delight of riding on a pony, or of wearing a new coat, consists in the satisfaction of this instinct, and vanishes if there be no spectators. A little later, with the growth of self-consciousness the instinct may find expression in the boasting and swaggering of boys, the vanity of girls. . . . . .

The situation that more particularly excites this instinct is the presence of spectators to whom one feels oneself for any reason, or in any way, superior, and this is perhaps true in a modified sense of the animals. . . .

As regards the emotion of subjection or negative self-feeling, we have the same grounds for regarding it as a primary emotion that accompanies the excitement of an instinctive disposition. The impulse of this instinct expresses itself in a slinking, crestfallen behaviour, a general diminution of muscular tone, slow restricted movements, a hanging down of the head, and sidelong glances. . . .

In children the expression of this emotion is often mistaken for that of fear; but the young child sitting on his mother's lap in perfect silence and with face averted, casting sidelong glances at a stranger, presents a picture very different from that of fear." ['08, pp. 62-65, *passim.*]

These tendencies, if taken as named, are too vague to be of much help in prophesying human behavior, while the detailed descriptions of them seem to me to fail to tell what makes us abashed and assertive. I quote them so that the reader may have a stimulus toward criticism of the view which I have been defending.*

*See also, for a general description of certain aspects of the behavior in question, complicated by training, *Showing off and Bashfulness as Forms of Self-Consciousness,* by G. S. Hall and T. L. Smith ['03], in the Ped. Sem. Vol. 10, pp. 159-199.

'Self Conscious' Behavior.—The alternations of shy and assertive behavior shown by little children toward visitors, by young people toward the opposite sex, and by all of us upon occasions, are at times due to a balancing of the responses in the case of one same situation which arouses neither especially, now one and now the other set of responses being made according to minor variations in the responder. They are at times due, I think, to actual changes back and forth in the behavior of the person who is the situation.

There may well be in addition special tendencies to respond to a human being who gives one no notice by various forms of aggressive and coy display. I am unable to decide whether the lessons of experience that various antics, showing one's possessions, nestling up to or tugging at the person in question and the like get attention to oneself are or are not adequate to explain the features of 'showing off' and 'attracting notice' which are left over after curiosity, attention-getting, 'mutilated mastery,' sex-behavior and general sociability have been reckoned with.

Galton ['83, pp. 47-57] describes somewhat vaguely certain tendencies, which he calls 'slavish instincts,' 'incapacity of relying on oneself and a faith in others,' and the like, and which he thinks 'have been ingrained into our breed' and 'are a bar to our enjoying the freedom which the forms of modern civilization are otherwise capable of giving us.' If I understood the facts which he has in mind, they seem to be certain aspects and results of the tendencies which have already been listed here under gregariousness, approval and submission, when combined with a relative lack of originality and of power in abstract thought.

OTHER SOCIAL INSTINCTS

Sex Behavior.—To disentangle what is original in sex passion and the manifold activities of courtship and love from what is learned as custom, or produced by cross influences from other social habits, is a necessary preliminary to any complete

theory of education. But the task demands a volume of its own in which the facts of mental pathology and of the sex life of many races as well as those hidden by modern taboos can be presented with the frankness which so important a subject deserves. The reader is referred to A. Forel's *The Sexual Question* and A. Moll's *The Sexual Life of the Child* as perhaps the most useful books in English.

The main chain of situations and responses originally involved is as follows: To the situation, 'a certain period of life and, in the male, a certain interval since the last discharge of spermatozoa,' the response is a restlessness and attentiveness to human beings of the opposite sex who do not arouse inhibiting responses of disgust. To man in this situation the presence of a not too young or old person of the opposite sex arouses the responses of display, aggressive in the male, coy in the female. To the total situations resulting, the female responds by coy advances and retreats; the male, by caressing pursuit and capture. The former is satisfied by, and so instinctively maintains, whatever augments the aggressiveness of the male; he responds similarly to the hopeful difficulties which her behavior offers. Capture and submission are responded to by mutual absence of fear, disdain and the like,—the instinctive basis of the perfect confidence celebrated by poets,—and by satisfaction in bodily contact, including as a final element the contact necessary to the fertilization of the ovum. The entire behavior in original nature is neither licentious nor ideal, being destitute of images or notions of any sort.

Secretiveness.—Secretiveness and confession, both popular in civilized mankind, seem to be so often inexplicable by training that original tendencies to act in secret in some cases, and to get attention to one's self at all costs in others, may be suspected. But they are perhaps simply varieties of shyness and display. Secretiveness in the sense of a proclivity to conduct love affairs in isolation and in the dark is a special tendency that does seem to be unlearned.

Rivalry.—No one can doubt that the facts vaguely referred

to by Emulation or Rivalry have some basis in man's inborn organization; but, as with maternal affection, pugnacity or the hunting instinct, it is necessary to define the tendencies and separate out those elements of them which are original from those into which they grow in the course of man's social training.

The two essential facts in rivalry are: the increased vigor in man's activity when other men are engaged in the same activity and the satisfyingness of superiority to them. It may be that in the course of life any sort of fellow-working or playing becomes a stimulus, and any sort of superiority a satisfier. But original nature has no such desire for abstract superiority, and its responses to fellow-working and playing are limited to the work and play which one's fellows instinctively pursue. Original emulation or rivalry is, in the first place, a group of tendencies to respond more vigorously in trying to get some one's attention upon perceiving a fellow creature's attempts to get it, in chasing some animal upon perceiving a fellow creature chasing it, in pulling toward one's self a thing when a fellow creature is pulling it toward himself, in running toward an object toward which he runs, and the like. In the second place, it is the responses of annoyance at being deprived of some one's attention by another, of satisfaction at getting some one's attention in spite of another, of annoyance at being outdone in the chase, the seizure or the struggle, of satisfaction in getting the prey, retaining the toy or being on top in spite of competitors, and the like.

It is upon such special stimulations and satisfactions rather than upon a diffuse imitativeness and craving for superiority that education at the start has to rely. As Dr. Ordahl, who has given the best single account of the facts of animal and human rivalry, says: "That it has become an instinctive response to all situations involving a possible chance of surpassing another, we have, I think, much evidence to show improbable. It is an instinctive response only when the situation involves the natural tendencies of the animal." ['08, p. 506.]

Quantitative estimates of the effect of rivalry are much needed. Triplett ['98] noted that the records for bicycle riding made in competition averaged four and a half per cent (he gives this as three and a half by reason of an arithmetical error) faster than the same records made against time. He also tested forty children, mostly ten, eleven and twelve years old, in turning a wheel, whereby a seen flag circled a track, with and without artificially arranged competition. In general the rate with human competition was two per cent faster. Triplett thinks that this slight superiority is a composite of a greater superiority for some and an inferiority for others who became 'nervous' and so 'went to pieces' under the excitement of competition. Triplett did not, however, attempt to assign any defined share of this effect to original rivalry as distinct from acquired habits.

In the lower animals emulation is notably utilitarian. The victor gets the spoils. Dr. Ordahl notes that the young bird that calls oftenest and loudest does get the most food; that in cattle rivalry is chiefly over food and mates; that horses do not race in play; and that it is very difficult to teach dogs to race. This utilitarian quality holds true of original human rivalry to a greater degree than is generally thought to be the case. The presence of a competitor commonly does make it pay to put forth extra effort. In a society living by its instincts, the presence of a competitor would commonly make it pay to put forth extra effort, and to win would commonly be to win some thing.

Coöperation.—It is probable that certain modifications in the hunting responses occur when they are made in the company of other men hunting the same thing; but what they are cannot be stated. So also one attacked when in the company of other men behaves otherwise than he would if alone; but, aside from the facts elsewhere noted and a tendency, under conditions which are not clearly made out, to huddle together instead of scattering, I cannot say what the coöperative behavior is.

Suggestibility and Opposition.—Suggestibility seems to mean the tendency to believe without proof and to act without sufficient reason. Man obviously does not have to learn suggestibility in this sense. Indeed he spends much of his life in getting rid of it. But such behavior is a secondary consequence of tendencies already described or to be described, not a new set of bonds, requiring a separate place in our list. The same holds good, I think, of the instinctive basis of the tendencies to self-assertion which Royce emphasizes in the following words: "Side by side with the social processes of the imitative type appear another group of reactions practically inseparable from the former, but in character decidedly contrasted with them. These are the phenomena of *Social Opposition* and of the love *for contrasting* one's self with one's fellows in behavior, in opinion, or in power. These phenomena of social contrast and opposition have an unquestionably instinctive basis." ['03, p. 277.]

Envious and Jealous Behavior.—It is an original tendency of man to be annoyed by the perception of another* receiving certain attention and treatment which his own behavior would otherwise get for himself. Young children are thus intolerant of the fondling of others by their mother; lovers, of the attentiveness of their mates to others; mothers, of the affection and notice given by their children to others. There seems, however, to be no uniform behavior characteristic of these jealous discomforts. Attacks on the competing object, seizure and holding of the person whose attitude toward one is being made inadequate, general raging, sulking, pining, grief and other activities are manifested. The original basis of envy seems to be simply discomfort at seeing others approved, and at being outdone by them.

Anyone with a special interest in the natural history of jealousy and envious behavior will find in Dr. A. L. Gesell's *Jealousy* [A. J. P., vol. 17, pp. 437-496] an account of the

*The 'other' may be a thing or an event as well as a person.

many acts and expressions which are commonly referred to by jealousy and envy. From this material the student can himself decide what their roots in original nature are.

Greed.—The elements out of which what is original in greed is composed have been listed elsewhere. To go for attractive objects, to grab them when within reach, to hold them against competitors, to fight the one who tries to take them away, to go for, grab and hold them all the more if another is trying to do so—these lines of conduct are the roots of greed. The word is, in common use, restricted to those manifestations in which what we consider a normal balance between these tendencies and more generous ones is exceeded.

Ownership.—By the instinct of ownership may be meant either original tendencies to resist the abstraction from one's person or immediate neighborhood of an object which one is using or has recently (within a few minutes) acquired, or original tendencies to be satisfied by having on one's person or within the range of one's senses many objects with which no one interferes. The former have already been listed under the instinct of possession; the latter are more doubtful. The very common enjoyment of owning, that is, having complete power over, things rather than merely using them subject to possibilities of interference or despoiliation, no matter how remote, is the outgrowth of training coöperating with one or both of these tendencies.

*Kindliness.**—The situation, 'a living thing displaying hungry, frightened or pained behavior by wailing, clinging,

*I use the word *kindliness* for parts of the tendency which James calls sympathy, including other parts under mothering behavior. The word sympathy has been used for very different traits in the service of quarrels about ethical theories and may well be avoided, even when, as here, the behavior named by it is stated objectively. It has meant benevolent feelings, such as mothers have toward their children; annoyance at the signs of suffering, such as a hard-hearted boarder might feel at a child's wailing or a sick man's groans; and the duplication, in an observer, of any instinctive behavior—fear, anger, elation and the like—which he witnesses. This last variety will be treated in this inventory under *Imitation.*

holding out its arms and the like,' provokes attention and discomfort and may, if attendant circumstances do not shunt behavior over to the hunting, avoiding or triumphing responses, provoke acts of relief. Whether this last issue is a consequence of the original bonds described under the instinct of motherly behavior or is a somewhat independent and differently specialized kindliness, is of little importance for our purpose. The former is the likelier, but some odd facts suggest that specialized tendencies to share food and social protection with the suffering may have arisen as inborn qualities of the natures of certain social animals. The commonest bodily conditions due to pity, as reported by Saunders and Hall ['00], are *loss of appetite* and *inability to sleep!* The irrational impulse to get the sick to eat seems to prevail the world over; and watching over them is often a custom justified now more by its satisfaction of the impulses in the watcher than by its value to the watched. In man's life, for the first nine-tenths of his history, a tendency to feed and watch by those who were sick, wounded and afflicted with sores would have perhaps been a form of mutual aid advantageous to the group's survival and one that could conceivably have originated as a variation from motherly behavior.

Another aspect of original kindliness is the positive satisfyingness of witnessing behavior characteristic of welfare in our fellows. Even the mean and brutal man naturally likes, apart from periods of rage and hunting, to see people happy. The happy behavior of others is pleasant, as flowers, sunshine and food are. It provokes, if competing responses are not too strong, kindly behavior in the shape of welcome, smiles, laughter, and the sharing of food. This kindly behavior is not necessarily confined to human beings; the child may offer a part of his cooky to a toy, or caress a flower. As Cooley says, "it flows out upon all the pleasantness the child finds about him." ['02, p. 47.] In an ordinary environment, however, people are its main stimuli and recipients.

Teasing, Tormenting and Bullying.—Teasing, tormenting

and bullying are the most notable inborn exceptions to childish kindliness. They are due, I judge, to the competing tendencies to manipulation and curiosity, hunting, scorn and mastery. Manipulation and curiosity easily develop into teasing. A child tends to do all sorts of things to people as well as to things, and is restless at the quiescence of a person as he is at that of any object. If the person who is pulled, poked, hit, called to, run after or jumped upon plays back, the natural course of development is toward what is called play. If the person reacts by energetic and victorious angry behavior, the child abandons its manipulation and pleased interest in what the person will do in favor of fighting, flight or submissive appeal. If the person neither plays back nor punishes, but behaves in a vexed, sullen, frightened or insufficiently punitive angry way, the child will, according to its total make-up and the temporary set of its mind, abandon, continue or increase his curious manipulation of the person, and the observer will call his behavior teasing or tormenting. Teasing those who are unable or unwilling to revenge themselves then inevitably becomes a habit in the case of children of mean and brutal natures.

When the hunting responses are called forth by a human being, they (alone or in combination with attempted mastery) produce a special form of play typically characterized, as Burk has shown, by "pursuing, throwing down, holding down, putting knee on vanquished victim, pinching, pulling hair, pulling ears, striking, shaking, throwing missiles, dancing about conquered victim, laughing, clapping hands, . . . smiling, a triumphant air." ['07, p. 228.] In the course of training, threats may to any extent replace the actual treatment of the person as prey or slave. Many degrees of intermixture of the responses provided to an animal to be caught, torn to pieces and eaten, and of those provided to an antagonist before and after he gives instinctive tokens of submission, are found. Obviously such cruelty and bullying can occur only when the one who arouses the hunting and mastering responses is unwill-

ing or unable to protect himself. Such a one also probably specially arouses them.*

The history of slave-driving, hazing, persecution, and the almost universal inequitable use of delegated powers by governors, generals, popes, school-masters and all those in authority, warrants the conviction that the hunting response does not originally distinguish man from other animals at all surely, and that submissive behavior does not as uniformly bring release from aggression in man as it does in the mammals in general. Motherly behavior and the other instinctive forms of kindliness are very inadequate protections against the inborn impulses to cruelty. In children of mean and brutal nature, bullying is therefore almost sure to occur unless it is deliberately stamped out by education.

Man's inhumanity to man is so common, and his early history has been pictured as a so unmitigated strife, that my account of original kindness and cruelty has doubtless seemed too mild. Popular evolutionary psychology has emphasized the selfish and blood-thirsty aggressiveness of our early ancestors and the triumphs of civilization in holding the wild beast within us in check by the traditions of justice and mercy which each generation is forced to accept and which they somewhat mysteriously improve. All this is, in a rough way, true; but popular psychology has failed to make clear—and, even to realize fully—that civilization does not so much create kindness and repress cruelty as merely redirect them. It has also quite mistaken the facts in fancying that the primitive male was a roving man-slayer and that the primitive woman's hand was against every creature save the child at her breast. The anthropologists who have made this a matter of study would, on the contrary, be fairly represented by the following quotation:

"In short there is found in the humblest tribe of savages

*When they are aroused by others, whose retaliation makes the outcome mutual rough play, wars of words, or the subjection of the original aggressor, the resulting behavior is, by custom, not called teasing or bullying.

no small share of the capacity to bear and forbear, no slight measure of warm affection and of a natural humanity. The dance and the chant, the merry game and the funeral wail, their wedding festivities, and their care of the sick and the infirm, even though it tires at last in the case of the very aged or of the chronic invalid, the festive ceremonies of naming and initiation, the devotion shown by each to the other in battle, and the general cohesiveness of life from year to year mark in the poorest savages an advance, solid though not phenomenal, above the highest social life of the lower animals. The more closely we study the earlier stages of human development, the more will we be inclined to agree with the eloquent summary of Tylor (Anthropology, p. 402): "Mankind can never have lived as a mere struggling crowd, each for himself. Society is always made up of families bound together by kindly ties. Their habits, judged by our notions, are hard and coarse, yet the family tie of sympathy and common interest is already formed, and the foundation of moral duty already laid in the mother's patient tenderness, the father's desperate valour in defence of home, their daily care for the little ones, the affection of brothers and sisters, and the mutual forbearance, hopefulness, and trust of all."* [Sutherland, '98, vol. 1, p. 351 f.]

There are other original responses to the behavior of human beings—for example, sulkiness, grieving, the horse-play of youths, the cooing and gurgling of infants, and their satisfaction at being held, cuddled, and carried. There are also other situations offered by human nature to which original tendencies are bound. I cannot but believe that certain emphatic signs of youth and of old age, of health and of disease, of frankness and of deceit, of aggressiveness and of fear, and of many other conditions, all possess original potency to make a difference in the behavior of men toward the person in question. It would indeed not be very far wrong to assume that every feature of instinctive behavior in any one human being produced some instinctive response in those witnessing it.

*For an elaborate and admirable study of early helpfulness and its probable original roots, the reader should consult Kropotkin's *Mutual Aid: a Factor of Evolution*, '02. This author is perhaps over-enthusiastic and ready to find what he seeks, but his book is an appropriate antidote to the popular misconception of moral evolution.

All these tendencies must, however, pass without further description here, partly that room may be left for more important matters, but chiefly because I am unable to tell with any surety what these subtler tendencies are.

Finally, it should be remembered that the original tendencies listed outside of this chapter often have the behavior of other human beings as their provocatives. Man originally makes no abstract dichotomy of nature into things and persons. Angry and frightened behavior, manipulation and hunting, for example, are fundamentals of social life as well as of adaptation to the rest of nature.

CHAPTER VIII

Responses to the Behavior of Other Human Beings: Imitation

Imitation is a word of too many different meanings to be used without qualifications. It may mean a tendency to make movements similar to those made in the animal's presence, or a tendency to produce a result similar to a result produced in the animal's presence, or a tendency to use the behavior of other animals in any way as a model or guide influencing one's behavior toward some degree of likeness thereto. The behavior of other animals may be regarded as working immediately, making the animal do the like in the same way that a loud noise makes him jump; or by arousing an idea of the movement; or by arousing an idea of the result produced; or by arousing an idea that has by habit led to the movement; or by arousing ideas of various sorts that indirectly make his behavior more like the behavior of the other animal than it would otherwise have been. Indeed, imitation is used by Tarde and other sociological writers, to mean little more than the repetition, for any reason, of ideas and acts and feelings like those which other men have or have had.

Even writers who are in general careful to define the facts which they assume or assert, commonly use the term imitation very loosely. For example it is impossible to tell whether Royce, in the following quotation, should be ranked as favoring the first, the second, the third, the fourth, or none, of the above:—"On the basis of the general social interests, there appear more special instincts, amongst which the most prominent is the complex of instincts suggested by the name *Imitation.* It is by imitation that the child learns its language. It

is by imitation that it acquires all the social tendencies that make it a tolerable member of society." ['03, p. 276.]

It is better, therefore, instead of asking vaguely whether imitation of other men is an original tendency in man, to put separately the following questions:—

A1. Do the sense-presentations (chiefly through sight) of all movements as made by another produce in man, apart from all training, *identical* movements?

A2. *Similar* movements?

A3. *Tendencies to make similar* movements?

A4. If some, but not all movements, have this power, which are they?

B1. Do the sense-presentations of all positions of the body taken by another, all sounds made, all facial expressions assumed and other *results* of movement upon the mover's body, produce in man, apart from all training, movements resulting in *identical* positions, sounds and looks?

B2. *Similar* ones?

B3. *Tendencies to make* movements resulting in identical or similar ones?

B4. If some but not all positions, sounds, looks, and the like have this power, which are they?

GENERAL IMITATIVENESS

In spite of the frequency of statements that the child makes every gesture that he sees and every sound that he hears,* no

*Such as:—

"The child toward the end of the first year, often reproduces nearly every sound he hears. Sometimes this is done almost automatically and with photographic exactness." [Kirkpatrick, '03, p. 228.]

"When a child sees an interesting movement or hears an interesting sound, he has not only a tendency to move all his muscles, but a stronger special tendency to move the muscles necessary to reproduce the perceived movement or sound. [Ibid., p. 83.]

"Imitation usually makes rapid strides in this period (second half year). In one case gestures were imitated at eight months, and words at nine. . . . Sigismund observed the instinct of imitation showing

one who has tried to teach infants to talk, or five-year-olds to write and sing, will for a moment believe that behavior witnessed produces identical behavior by any original potency. Writers who have seemed to say so cannot, if possessed of any sense for fact, have meant what they said. Questions A1 and B1 can be dismissed each with a flat NO. At the most a general tendency to imitate can only be as in A2 and B2 a tendency to make movements, or get results, that are *somewhat like* whatever ones are witnessed.

I can find no evidence that any such tendency is original in man. As will be stated later, certain particular sorts of behavior do originally provoke in the spectator behavior that resembles them, but, so far as I can see, behavior in general does not. Consider the difficulty of getting an infant to even approximately 'wave a bye-bye,' 'pat-a-cake,' 'blow a kiss,' or 'spit it out;' and the extreme difficulty of getting him to blow his nose, clear his throat, or gargle. Sit before him and perform time after time a score of such novel but simple acts as putting your right hand on your head and your left on your right shoulder. He does not in nine cases out of ten do anything more like the act you perform than like any other one of the twenty.

Of course, after he has performed many acts as sequents to

itself in the third quarter of the first year." [Tracy, '93, second edition, p. 129.]

"In man we have an imitative tendency of a somewhat different type. He is so sensitive to what companions do that he not only does what they do when the actions are of the usual type, but he is so affected by movements which he perceives that he reproduces them, although they are entirely new." [Kirkpatrick, '09, p. 124.]

"Young animals, even some not gregarious, have an irresistible impulse to imitate any action of their parents, toward which their instinctive impulse is very weak, and they learn in this way what would never be developed in them individually without this imitative impulse." [Gross, '95, Eng. trans. of '98, p. 79.]

"This spontaneous imitation does not necessarily involve ideas. The mere perception of your beating the table with your hands or shaking your head is enough to prompt the child of about twelve months to beat the table with his own hands or shake his own head." [Stout, '03, p. 81.]

many situations, the latter including often the perception or idea of the act, you may frequently, by performing an act, get him to perform it also. But his act is then a result of learning, not of instinct; and your behavior provokes it in the same way that a verbal suggestion might. The course of human education is such that among the situations to which acts are bound as sequents, ideas of the acts are frequent. A human being's behavior thus often provokes similar behavior in another by provoking an idea to which it is, by past learning, a sequent. Such influence of one person upon another illustrates, however, the laws of habit, and nothing more.

The direct potency of behavior in creating something like it in another human being's behavior is not discoverable in any series of experiments in which the effects of the laws of exercise and effect* are precluded or allowed for. And the number of casual observations purporting to give instances of it is very, very small. Leaving for the moment those concerned with the production of sounds we have a rather paltry showing. For example, Preyer tested his child with the act of protruding the closed lips. This movement, which the child made customarily as an expression of attentiveness, Preyer made, close in front of him, from time to time. On the 105th day the child made it when he did. Preyer considered that the child did it from imitation and not from general attentiveness as hitherto, because of "the imperfect character of it in comparison with the perfect pursing of the lips when he makes the movement of his own accord in some other strain of the attention." ['81, Part I, p. 283.] This already very weak evidence of imitation is still further weakened by what follows. On the following days the experiment gave negative results and "further attempts at imitation occurred so seldom and were so imperfect, notwithstanding much pains on my part to induce them, in the following weeks, that I was in doubt whether they might not be the result of accidental coincidences." ['81, Part I, p. 283.] Preyer also reports that "in the seven-

*An account of these laws will be given in Chapter XII.

teenth week, the protruding of the tip of the tongue between the lips . . . was perfectly imitated once, when done by me before the child's face." ['81, Part I, p. 284.] The rest of his cases seem clearly special instincts and acquisitions, as laughing at a laugh, crying at a cry, drinking from a cup, using a spoon properly, and the like.

McDougall* reports that one of his children "on several occasions during his fourth month repeatedly put out his tongue when the person whose face he was watching made this movement." ['08, p. 106.] Tracy attributes to such imitation the fact that "a child of eight and a half months, having seen his mother poke the fire, afterwards crept to the hearth, seized the poker, thrust it into the ash-pan, and poked it back and forth with great glee, chuckling to himself" ['93, p. 104], but the case seems to prove rather too much and to be more probably explainable as the result of the general activity of the child, plus the direction of his attention to the poker and fire.

Moore ['96, p. 18] assumes that the act of the child, then 38 weeks old, in banging two spoons together upon seeing her mother do so was due to imitation. The chance for such an event to happen as a result of mere manipulation or learning is obviously very great.

Dearborn ['10, pp. 42, 76, 101, 117 and 197] paid special attention to appearances of imitation but seems to have found only behavior probably due to the instinctive gesture-and voice-play or to connections formed by experience irrespective of imitation proper, and set in action because the imitatee's act directed attention to certain objects. His most plausible case is a very weak one. "231st day. Over and over this morning after I had pounded with a round stick or wand on a pillow, thus making a loud noise, she would take the wand and similarly shake it against the pillow. This is the first complex, clear, certain imitation that has been observed. There can be

*It should be noted that neither Preyer nor McDougall believes in any *general direct* original potency of behavior witnessed to create its like.

no doubt about this case, for this is an action that would not be made accidentally. Five times this experiment was repeated, and each time successfully. Later in the day she would not imitate the movement of shaking the hand to her." [p. 101] For this case to be other than weak, it would be necessary to have evidence that the infant of seven months did not, by reason of other instincts or previous training, tend to take an object dangled interestingly before her, and did not so tend to pound with wand-like objects grasped. I cannot, of course, deny that such evidence existed in the case of this child, but with three infants that have been under my own observation, such behavior would by no means have meant imitation. And I venture to assert that had Dearborn pounded on the pillow with one hand, while dangling the wand nearby, the infant would have been hardly less likely to pound the pillow with the wand. Further, had he, after the first pounding, waved the wand horizontally in the air, the infant would not then have so waved the wand, but would have repeated the pounding.

Cooley, who watched especially for evidence of general instinctive imitativeness in his children, found none that could not be explained better as the result of general activity or of learning. He notes sagaciously that, in one of the most plausible appearances of imitation, the behavior of another person probably acted simply as the first step in a habit, since a verbal request produced the behavior in question even more surely. "M. had a trick of raising her hands above her head, which she would perform, when in the mood for it, either imitatively, when someone else did it, or in response to the words 'How big is M?', but she responded more readily in the second or non-imitative way than in the other." ['02, edition of 1910, p. 27.]

I believe the same absence of evidence of any general original production of similar behavior by behavior witnessed holds good for sounds as well. To the hypothesis that seeing the movements of another's mouth-parts or hearing a series of sounds in and of itself produces similar movements or sounds, I find the following objections:—

"First of all, no one can believe that *all* of a child's speech is acquired by direct imitation. On many occasions the process is undoubtedly one of the production of many sounds, irrespective of the model given, and the selection of the best one by parental reward. Any student who will try to get a child who is just beginning to speak, to say *cat, dog* and *mouse* and will record the sounds actually made by the child in the three cases, will find them very much alike. There will in fact be little that even *looks* like direct imitation until the child has 'learned' at least forty or fifty words.

The second difficulty lies in the fact that different children, in even the clearest cases of the imitation of one sound, vary from it in so many directions. A list of all the sounds made in response to one sound heard is more suggestive of random babble as modified by various habits of duplicating sounds, than of a direct potency of the model. Ten children of the same age may, in response to 'Christmas,' say, kiss, kissus, krismus, mus, kim, kimus, kiruss, i-us and even totally unlike vocables such as hi-yi or ya-ya.

The third difficulty is that in those features of word-sounds which are hard to acquire, such as the 'th' sound, direct imitation is inadequate. The teacher has recourse to trial and chance success, the spoken word serving as a model to guide satisfaction and discomfort. In general no sound not included in the instinctive babble of children seems to be acquired by merely hearing and seeing it made.

A fourth difficulty is that by the doctrine of direct imitation it should not be very much more than two or three times as hard to repeat a two- or three-syllable series as to repeat a single syllable. It is, in fact, enormously harder. This is, of course, just what is to be expected if learning a sound means the selection from random babbling plus previous habits. If, for instance, a child makes thirty monosyllabic sounds like pa, ga, ta, ma, pi, gi, li, mi, etc., there is, by chance, one chance in thirty that in response to a word or phrase he will make that one-syllable sound of his repertory which is most like it, but

there is only one chance in nine hundred that he will make that *two-syllable* combination of his repertory which is most like it." ['11, p. 254 f.]

On the other hand the variety of elementary sounds which children make as a result of the instinctive vocal play, before there is any question of imitation, may be under-estimated. There is no need for imitation as a creator of the elements of articulate speech. Moore reports that "At the close of the fourth month it was my impression that the child had made well nigh all the sounds which occur in the language." ['96, p. 115.]*

Perhaps the advocates of imitation as an original mental function would admit that witnessed behavior does not originally produce its like in any such uniform, mechanical way as a shock produces winking, or pain a cry. They would perhaps claim only a tendency or potentiality or disposition toward the production of similar movements or results. They would, that is, insist that questions (A3) and (B3) on page 109 are the really important questions.

This doctrine that there is an original general potency of witnessed behavior to evoke its like, but only in the shape of a tendency to make like behavior appear a little oftener than it would by the laws of exercise and effect alone, is one that can

*The following is a list of the principal sounds and syllables actually recorded by Moore between the twelfth and fortieth weeks:

In crying:			
Eng	dă	ŭ	mă-mă-ă
mă-ă-ă, explosive â		ĕ	nĭn nĭn
In babbling:			
Ĕng	Z	gr-r-r	bō wō
ăng	diddle, diddle, ē, ē	ing	bow bow
d	ĕ	ŭ-ŭ ŭ	bă
t	th	ŭdn	pop-pă-pă-pă
bă	dth	ŭdŭ	bob-bă
â	ûm gô	good	mom-mă
ô	ă gô	ō	ĕdă
ŭr-r-r	ă mă	â dă	tă tă
s	hadn	mă	tduck

at present be neither demonstrated nor refuted. It does not much matter, for if by original general imitativeness is meant only a dubious possibility that witnessed behavior will produce behavior that is occasionally somewhat more like it than would otherwise be expected, it is of little practical consequence. For even such a remnant of general original imitativeness, however, I cannot find adequate evidence; and it has many fundamental difficulties. The only tendencies or potentialities or dispositions that we know in human behavior are probabilities of connections between situation and response, and these probabilities of connections in behavior mean simply *partly-made* connections present or future between neurones and neurones, or the greater *readiness* and *efficiency* of certain neurones in making connections.

The number of specific partly-formed bonds, or readinesses, or efficiencies, required for a general propensity toward imitativeness would, of course, be legion, representing a greater biological pre-formation than that required by all the tendencies so far listed in this inventory. General original imitativeness, even in the form of a potentiality, must, if it means anything, mean an extraordinarily elaborate inborn arrangement of man's neurones.

The majority of those who have assumed the existence of an original tendency to imitate have probably not considered just what arrangements in the nervous system it requires. McDougall, who does consider the facts, noting that for each special movement so imitated "we have to assume the existence of a . . . perceptual disposition having this specific motor tendency," allows man's original nature as a *possibility* ("It may be that") a limited number of such percept-movement connections. ['08, p. 106] Kirkpatrick maintains the traditional belief in spite of his awareness of this difficulty, and makes the logically necessary, but to my mind preposterous, assumption that by original nature "the path from the auditory center" for a given sound "is more open toward the motor center concerned in producing the same sound than in any

other direction," and that "A similar truth holds regarding centers concerned in the visual perception of movement and the motor centers concerned in executing the same movement." ['09, p. 293]

I judge, therefore, that the original attentiveness of man to the acts, movements, positions, sounds and facial expressions of other men and the original satisfyingness of the approval so often got by doing what other men do, which have been described in Chapter VII, are really the tendencies or predispositions or potentialities that do the work in question.*

THE IMITATION OF PARTICULAR FORMS OF BEHAVIOR

There being no general original imitativeness, are there perhaps certain particular movements, positions, sounds and facial expressions the perception of which does produce their like?

McDougall's answer is that, first, the responses involved in the principal instincts which he lists (i.e., flight—fear, repulsion—disgust, curiosity—wonder, pugnacity—anger, self-abasement—subjection, self-assertion—elation, parental instinct—tender emotion) when made by one man, serve each as a situation that originally provokes the same response in a spectator. In the second place, he thinks that a few of certain common acts may, when seen, be specific stimuli to similar acts in the infant who sees them. I quote from his statement of the first of these theories at some length.

"I think the facts compel us to assume that in the gregarious animals each of the principal instincts has a special perceptual inlet (or recipient afferent part) that is adapted to receive

*Readers who have been misled by antiquated views of imitation in the lower animals, should note that the existence of an original general tendency in the monkeys to duplicate the movement that the animal observes another animal of the same species performing, or to produce the resulting sound or position of the body which the other animal produces, is very improbable. Kinnaman, Watson, Haggerty and others who have observed the behavior of the primates scientifically find only slight semblances of imitation of any sort, and no signs whatever of a direct original potency of behavior witnessed to create its like.

and to elaborate the sense-impressions made by the expressions of the same instinct in other animals of the same species—that, e.g., the fear-instinct has, besides others, a special perceptual inlet that renders it excitable by the sound of the cry of fear, the instinct of pugnacity a perceptual inlet that renders it excitable by the sound of the roar of anger.

Human sympathy has its roots in similar specialisations of the instinctive dispositions on their afferent sides. In early childhood sympathetic emotion is almost wholly of this simple kind; and all through life most of us continue to respond in this direct fashion to the expressions of the feelings and emotions of our fellowmen. This sympathetic induction of emotion and feeling may be observed in children at an age at which they cannot be credited with understanding of the significance of the expressions that provoke their reactions. Perhaps the expression to which they respond earliest is the sound of the wailing of other children. A little later the sight of a smiling face, the expression of pleasure, provokes a smile. Later still fear, curiosity, and, I think, anger, are communicated readily in this direct fashion from one child to another. . . .

Adults vary much in the degree to which they display these sympathetic reactions, but in few or none are they wholly lacking. A merry face makes us feel brighter; a melancholy face may cast a gloom over a cheerful company; when we witness the painful emotion of others, we experience sympathetic pain; when we see others terror-stricken or hear their scream of terror, we suffer a pang of fear though we know nothing of the cause of their emotion or are indifferent to it; anger provokes anger; the curious gaze of the passer-by stirs our curiosity; and a display of tender emotion touches, as we say, a tender chord in our hearts. In short, each of the great primary emotions that has its characteristic and unmistakable bodily expression seems to be capable of being excited by way of this immediate sympathetic response. If, then, the view here urged is true, we must not say, as many authors have done, that sympathy is due to an instinct but rather that sympathy is founded upon a special adaptation of the receptive side of each of the principal instinctive dispositions, an adaptation that renders each instinct capable of being excited on the perception of the bodily expressions of the excitement of the same instinct in other persons. . . ." ['08, pp. 93-95, *passim*]

There is something peculiarly attractive and plausible in

this doctrine that "the instinctive behavior of one animal directly excites similar behavior on the part of his fellows," but it is doubtful whether nature has worked to so simple a wholesale result. The similarity of the behavior is not sure in any case, and seems contrary to fact in the case of the tendencies of pugnacity—anger and parental instinct—tender emotion.

The spectators of an infuriated man, or of two men raging at each other, are not thereby provoked to similar acts and feelings. They manifest rather 'curiosity-wonder,' forming a ring to stare, the world over. So with other mammals. When Professor McDougall wrote that "anger provokes anger" he probably had in mind the fact that angry behavior of A toward B provokes angry behavior of B toward A. But that is irrelevant to his purpose, since he surely does not wish to contend that A's fleeing from B makes B flee from A, that A's shrinking from B makes B shrink from A, that A's self-abasement before B makes B abase himself before A.

The instinctive behavior of the mother in holding, cuddling and fondling does not excite similar behavior on the part of her fellow men and women. They need not be moved thereby to cuddle it, her, one another, their own babies, or anything else. The chief response in them may be approval, envy or mild amusement, as often as tender emotion of the same sort as her behavior expresses. The sight of a child *not* being tenderly treated is in fact probably more likely to arouse tender emotion in spectators than the sight of one on whom it is lavished. It is indeed the unloved rather than the loved or the loving who move the motherly spirit in the spectator.

No one common rule for the original effect of the perception of instinctive behavior in another man can be given. His behavior in attention, cautious approach, the avoiding reactions and the hunting instinct, produces something much like itself. His behavior in anger, combat for mastery, courtship and parental affection produces in the spectator something as a rule quite unlike itself. The effect of his behavior in attempted

mastery and submission is dubious, varying greatly with its concomitants and being little known in any case. Seeing a man in the attitude of submission may make the spectator more submissive or more aggressive. Whether the perception of instinctive behavior originally produces like behavior is a question to be studied separately in the case of each instinct.

The question is often very difficult.* Under present conditions children would usually learn by training to run from whatever others ran from, to look at whatever others looked at, and the like, even if there were no original tendencies to do so. Moreover the object or event, the perception of which causes A to respond by a certain instinctive behavior which then spreads to B, is likely to be perceived by B also, so that whether his behavior is a response to A's behavior or to the object itself is often in doubt. For example, A's fear at a snake may arouse B's fear indirectly by merely calling B's attention to the snake. Finally A's response may, upon his perception of B, be modified to include certain behavior which acts as a special signal to provoke approach, fear, or whatever the response may be, in B. Thus the danger-signal might be given by A when frightened in company, though not when frightened alone; and B might respond, not to A's general fright, but to the danger signal.

The most probable cases for the production, by behavior witnessed, of similar behavior in the witness, are *smiling when smiled at, laughing when others laugh, yelling when others yell, looking at what others observe, listening when others listen, running with or after people who are running in the same direction, running from the focus whence others scatter, jabbering when others jabber and becoming silent as they become silent, crouching when others crouch, chasing, attacking*

*Even so simple a question as whether the human being's original nature makes him smile at a smile is in dispute. Cooley thinks not, referring the observed facts to the child's tendency to smile in satisfaction and to the satisfyingness of all unthreatening movement within his field of view. ['02, pp. 47 and 64.]

and rending what others hunt, and *seizing whatever object another seizes.*

In my opinion these probabilities are all, or nearly all, real, and are the chief, or even the only components of "the imitative tendency which shows itself in large masses of men, and produces panics, and orgies, and frenzies of violence, and which only the rarest individuals can actively withstand."

In the second division of his account of what particular acts originally provoke similar acts in the spectator, McDougall says:—

"For the sake of completeness a fifth kind of imitation may be mentioned. It is the imitation by very young children of movements that are not expressive of feeling or emotion; it is manifested at an age when the child cannot be credited with ideas of movement or with deliberate self-conscious imitation. A few instances of this sort have been reported by reliable observers; e.g., Preyer stated that his child imitated the protrusion of his lips when in the fourth month of life. These cases have been regarded, by those who have not themselves witnessed similar actions, as chance coincidences, because it is impossible to bring them under any recognized type of imitation. I have, however, carefully verified the occurrence of this sort of imitation in two of my own children; one of them on several occasions during his fourth month repeatedly put out his tongue when the person whose face he was watching made this movement. For the explanation of any such simple imitation of a particular movement at this early age, we have to assume the existence of a very simple perceptual disposition having this specific motor tendency, and since we cannot suppose such a disposition to have been acquired at this age, we are compelled to suppose it to be innately organized. Such an innate disposition would be an extremely simple rudimentary instinct. It may be that every child inherits a considerable number of such rudimentary instincts, and that they play a considerable part in facilitating the acquisition of new movements, especially perhaps of speech movements." ['08, p. 106]

There may be such odds and ends of tendencies to duplicate particular acts. If so, no one knows what the acts are.

So far, the list begins and ends unimpressively with sticking out the tongue!

On the whole, the imitative tendencies which pervade human life and which are among the most powerful forces with and against which education and social reform work, are, for the most part, not original tendencies to respond to behavior seen by duplicating it in the same mechanical way that one responds to light by contracting the pupil, but must be explained as the results of the arousal, by the behavior of other men, of either special instinctive responses or ideas and impulses which have formed, in the course of experience, connections with that sort of behavior. Man has a few specialized original tendencies whose responses are for him to do what the man forming the situation does. His other tendencies to imitate are habits learned nowise differently from other habits.

CHAPTER IX

Original Satisfiers and Annoyers

THE ORIGINAL NATURE OF WANTS, INTERESTS AND MOTIVES

Reason finds the aim of human life the improvement and satisfaction of wants. By reducing those to which the nature of things and men denies satisfaction, or by increasing those which can be fulfilled without injuring the fate of others, man makes his wants better. By changing the environment into a nature more hospitable to the activities he craves, he satisfies them. The sciences and arts arose by the impetus of wants, and continue in their service. They are the ultimate source of all values.

The original basis of the wants which so truly do and should rule the world is the original satisfyingness of some states of affairs and annoyingness of others. Out of such original satisfiers and annoyers grow all desires and aversions; and in such are found the first guides of learning.

By a satisfying state of affairs is meant roughly one which the animal does nothing to avoid, often doing such things as attain and preserve it. By an annoying state of affairs is meant roughly one which the animal avoids or changes.

Samples of original satisfiers or instinctive likes are:—*To be with other human beings rather than alone, To be with familiar human beings rather than with strange ones, To move when refreshed, To rest when tired, To be "not altogether unenclosed" when resting and at night.*

Samples of original annoyers or instinctive aversions are:—*Bitter substances in the mouth, Being checked in locomotion by an obstacle, Being hungry, Being looked at with scorn by other men, The sight and smell of "excrementitious and putrid things, blood, pus, entrails."*

To satisfy is not the same as to give sensory pleasure and to annoy is not the same as to give pain. The latter confusion is specially misleading, for pain is only one of many annoyers, and does not inevitably annoy. Being gently held when one wants to fight, tho not painful, is exceedingly annoying. A mother may welcome the pain she suffers for her child. With pleasure the case is somewhat different. If by it is meant simply the felt tolerability and welcomeness of a state of affairs, pleasure is a close symptom—almost a synonym—of satisfyingness. But the pleasurableness of certain sensations as commonly described in psychological treatises is a very partial symptom. Thus a sweet taste may be annoying and a bitter taste welcomed.

A long list could be made of such states of affairs as feeding when hungry, rest when weary, being cuddled when sleepy, running after an animal that arouses hunting behavior, getting nearer to it in the course of the running, jumping upon it when near, seizing it after the jump, subduing it after seizing it, holding a baby after giving birth to one, having it smile when held, cooing to it when it smiles. Such a list, however, can be replaced by one law which any of its items would exemplify,—that *when any original behavior-series is started and operates successfully, its activities are satisfying and the situations which they produce are satisfying.* The absence of food when hungry, being held so that one cannot chase the passing rabbit, being out-distanced by it, clutching the air instead of the prey at which one leaps, having the offered toy withdrawn as one reaches for it, immovability in the obstacle one pushes, are samples from a similar long list of original annoyers, all of the class described by the law that *when any original behavior-series is started, any failure of it to operate successfully is annoying.* For these laws to be adequate to guide theory and practice, however, the word 'successfully' must be defined objectively.

Successful operation cannot be defined adequately in terms of gross behavior without returning in a larger or shorter

circle to satisfyingness itself. To say that successful means the 'normal' action and 'normal' consequences of instinctive behavior leaves us with 'normal' to define, and in the end it will be defined back again as the successful or satisfying. To say that 'successful' means what furthers the life-processes of the animal leaves on our hands as exceptions such cases as the sacrifice of the mother's own life-processes to those of the child on the one hand, and such cases as rest rather than motion when freezing and intemperance of all sorts, on the other.

To replace the life-processes of the individual by the perpetuation of the species cuts out some of these exceptions, but adds others. Victory is satisfying, though gained by accident or numbers; bullying is satisfying, though due to qualities that weaken the species.

To say that successful means 'unimpeded' or 'unthwarted' or 'uninterfered with' tells fairly well what *movements* will be satisfying, since for a movement to be impeded is for it to fail as a movement. But to say that to fail to clutch the prey, clutching the air instead, is to be impeded or thwarted or interfered with is simply to say that an annoying situation is produced. It is true that mere freedom to complete the motions to which original nature impels in a given situation is satisfying, but the majority of original satisfiers involves also the production by the movement of some one effect rather than another. To run when nature so moves is satisfying, but to get from this place, or to that place, or nearer that animal, or ahead of this man, is commonly the larger satisfier in instinctive responses of flight and pursuit.

THE PRINCIPLE OF READINESS

Successful operation can in fact be satisfactorily defined, and what will originally satisfy and annoy can be safely predicted, only as a characteristic of the internal behavior of the neurones. By original nature a certain situation starts a behavior-series: this involves not only actual conduction along

certain neurones and across certain synapses, but also *the readiness of others to conduct.** The sight of the prey makes the animal run after it, and also puts the conductions and connections involved in jumping upon it when near into a state of excitability or readiness to be made. Even the neurone-connections involved in the response of 'clutching' to the situation of 'jumping and reaching it' and those involved in triumphing over it and rending it or taking it to one's lair are in a different condition when a chase is started than they otherwise are. The activities of the neurones which cause behavior are by original nature often arranged in long series involving all degrees of *preparedness* for connection-making on the part of some as well as *actual* connection-making on the part of others. When a child sees an attractive object at a distance, his neurones may be said to prophetically prepare for the whole series of fixating it with the eyes, running toward it, seeing it within reach, grasping, feeling it in his hand, and curiously manipulating it.

The fact is that it is the neurones, not the body as a whole, whose life processes are primarily concerned in the 'successful' operation of a behavior-series. By 'normal' or 'successful' operation we mean the externally observable signs of the action of neurones that are ready to act. And by the failure, or thwarting, of an original tendency we mean the observable signs of failure to conduct and connect in neurones which are

*That a conduction unit does vary, according to certain temporary conditions, in its readiness to act will be admitted by all students of brain physiology. The refractory period of a reflex is a demonstrated case of relative unreadiness. In the case of the extensor thrust in the dog, for example, the repetition of the stimulus within half a second or so does not produce a second thrust, and this unreadiness has been proved to be a function of the associative neurones concerned. [See Ladd and Woodworth, '11, p. 164 f.] That different conduction units under the same temporary conditions may vary in readiness to act as a result of inherited differentiation or their past history, would also, I think, be admitted by expects in brain physiology. This concept of varying readiness is, indeed, used freely in discussions of the physiology of reflexes, fatigue, recall, the association of ideas and the like.

ready to so act. Such satisfying states of affairs as those listed at the beginning of this chapter are states of affairs which stimulate, or at least permit, the action of neural connections and neural conductions that are in readiness to act; and the annoying states of affairs listed prevent such from acting.

The essential satisfyingness in these cases is then the conduction along neurones and across synapses that are ready for conduction and the essential annoyingness in these cases is the absence of such conduction.

Now this law holds good not only in the case of such definite behavior-series as feeding, hunting, fighting or sex-indulgence, but throughout behavior. Call the neurone, neurones, synapse, synapses, part of a neurone, part of a synapse, parts of neurones or parts of synapses—whatever makes up the path which is ready for conduction—*a conduction unit.* Then *for a conduction unit ready to conduct to do so is satisfying,* and *for it not to do so is annoying.*

Along with this concept of readiness to conduct, the opposite fact of *unreadiness* or *refractoriness* must be considered. If, as I believe, any conduction unit may be in a condition of repugnance to conduction in the sense that its own activities at the time make it less excitable by stimuli to conduction than is the case with the average condition of the average conduction unit, and if the law of readiness is true, we should expect as a law of *unreadiness* that *for a conduction unit unready to conduct to be forced to conduct would be annoying.**

This seems to be the case. Unreadiness to conduct, if such a thing existed, would be expected, as a result of long exercise of conduction across a fatiguable synapse and as a result of

*It is probably also the case that for a conduction unit that is *unready* for conduction *not to conduct* is *satisfying;* but evidence is so slight upon this complementary hypothesis that it will not be discussed here. It is a question whether the positive satisfyingness of rest for a function after its exercise, of peace after worry, of safety after fear, and the like is due to relief from conduction for unready conduction-units or to the actual conduction of ready units concerned in sensing bodily languor, gentle speech, familiar faces and the like.

weakening of the conduction unit by disease. For, in either case, the common response of protoplasm would be to protect itself against less remunerative action in favor of feeding and rest. Little is known of conduction units, their exhaustion or their diseases, but that little seems to show that conduction along an exhausted or diseased conduction unit is annoying. In neurasthenia and in so-called psychasthenia, activities of the nervous system which in health are satisfying or indifferent become annoying. When, on the other hand, the nervous system is in fine fettle from health and abundant sleep, activities which on the average are slightly distasteful, are welcomed.

I believe that the original tendencies of man to be satisfied and to be annoyed—to welcome and reject—are described by these three laws of readiness and unreadiness:—(1) that *when a conduction unit is ready to conduct, conduction by it is satisfying, nothing being done to alter its action,* (2) that *for a conduction unit ready to conduct not to conduct is annoying, and provokes whatever responses nature provides in connection with that particular annoying lack;* (3) that *when a conduction unit unready for conduction is forced to conduct, conduction by it is annoying.**

The facts hardest to account for by these laws are what may be called the *independent annoyers*—states of affairs

*The account given here of the influence of readiness to conduct and unreadiness to conduct resembles Ziehen's doctrine that pleasurable feeling-tone parallels a great, and unpleasant feeling-tone parallels a slight, readiness to discharge on the part of the neurones that are in action. "The pleasure-pain component of the psycho-physiological process is identical with the readiness of the cortical cells to discharge. A certain disturbance in the cells of the cortex (for example, a chemical change) expresses a certain sensory and ideational conscious content. In the case of any such disturbance the readiness to discharge can vary greatly —that is, the tendency and capacity to transmit the disturbance (for example, the chemical change) further along the association or projection fibres which arise from the cells, can be greater or less. The positive affective processes express a great readiness to discharge; the negative, a slight readiness." ['03, p. 15] Ziehen, however, assumes a scope and nature for the parallelism very different in certain respects from those to which the account given here would lead.

which almost always annoy, in whatever behavior-series they happen, such as sensory pains. It is necessary to suppose that the conduction units whose action causes sensations of pain are almost always unready to conduct. And for this supposition I must admit that there is no conclusive evidence. There is some, however. The interval between the application of the external stimulus and the pain-sensation is far longer than is the case with other senses. Moderate doses of certain drugs prevent the action of these conduction units without preventing the action of those concerned with other sensations.* The fact that extreme intensities of almost all if not all sensory stimuli produce pain would be simply and satisfactorily explained by the law of unreadiness. For it would be an expected consequence of the law of unreadiness that all conduction units should be unready to conduct stimuli far more energetic than those to which they were adapted. The law of unreadiness also accounts for the rare, but important, cases where sensory pains do *not* annoy, but are even potent satisfiers. A man knowing that pain in his eyes would mean that he was cured of threatened blindness might well cherish that pain when it came. In his case we should expect that the conduction units concerned *would* be made ready.

Finally, there are no important facts in opposition to the supposition that unreadiness to conduct on the part of the conduction unit concerned is characteristic of the conduction units concerned in sensory pains, and there is no important conflicting hypothesis to account for the intolerability of pain.†

*The central excitation of these conduction units producing hallucinations, illusions and images of pain is very rare, as if they were far less ready to act; even very violent and prolonged pain, as that of child-birth, can not commonly be imaged. This fact, however, can be explained otherwise.

† It is interesting to note that in the early stages of psychology no need was felt for *any* cause for the intolerability of pain. That pain should be avoided was taken for granted for much the same reason that primitive physics took it for granted that a stone thrown up would fall again. But intrinsically there is no more reason to assume that man must be distressed by pains and act so as to avoid them than to assume that he will be distressed by sweet tastes or the color blue. *Some* objective physiological hypothesis for the fact there must be.

The other chief original independent annoyers—annoyers *per se*—besides the sensory pains are bitter tastes, the sight, touch and smell of entrails, excrement and putrid flesh, touching slimy things, depression as in fear, grief, the absence of human beings, their disapproving behavior, and very intense sensory stimuli of all sorts. For some of these, such as bitterness, entrails, excrement, putrid flesh, sliminess, fear and grief, we must suppose, as with sensory pain, that the conduction units concerned are chronically unready. The explanation of the others is easier. The absence of human beings implies that the conduction units concerned with gregarious behavior, which are chronically ready to act, can not act. Disapproval by other human beings implies that the chronic craving for approval is denied indulgence and that certain conduction units, concerned in the conditions of the brain and body as a whole which we call shame, depression, and the like, are forced to act. The conduction units concerned with depression would by any hypothesis be supposed to be, in healthy men, chronically unready to act. For very intense sensory stimuli, as has been noted, man's neurones are chronically unready.

The states of affairs which have the most reason to be regarded as original satisfiers *per se,* independently of any particular behavior-series, are sweet, meaty, fruity and nutty tastes, glitter, color and motion in objects seen, being rocked, swung and carried (in childhood), rhythm in percepts and movements, elation, the presence of other human beings, their manifestations of satisfaction and their instinctive approving behavior. These are easily enough brought under the rule of the action of conduction units almost always ready to act.

The cloying effect of long continuance of a single sensory satisfaction, whereby it loses its zest and turns into an annoyance, is obviously in harmony with the hypothesis that satisfyingness is due to the action of conduction units which are in readiness to act. Continued action of a conduction unit would impair its readiness to act and would often involve the continued deprivation from action of other conduction units.

The satisfyingness, as a novelty, of states of affairs that for long thereafter are indifferent would also be in harmony with the theory. For a conduction unit which was in general only very slightly in readiness to act would, after having acted, have a rather long latent period of indifference.

Indeed, the phenomena of interest, cloying, fatigue and neurasthenia, all seem to be reduced to order when viewed as results of the conception of readiness of conduction units to conduct and of the laws that *conduction by units in readiness* is satisfying, while *conduction by units in unreadiness* and *readiness without conduction* are annoying.

One important group of satisfiers and annoyers deserves special mention. Other things being equal, to have sensations, to initiate movements and to make things happen are satisfying. That is, if these activities do not involve any annoyer (like bitterness, the exercise of a fatigued synapse, or disapproving looks) they satisfy in and of themselves. The human nervous system is 'ready to act' not only in such immediately practical ways as get food, sleep, protection or offspring, but also in that great variety of ways described as attentiveness to novel sensory stimuli, the curious examination of things, vocalization, visual exploration, facial grimaces, manipulation, diffuse play and 'being a cause.' What may be roughly called tendencies to *general mental activity* and *general physical activity* (though they are not as a matter of fact absolutely general) when given exercise satisfy, and when denied exercise annoy. The conduction units involved in many acquired situation-response series also in due time 'crave exercise'—that is, become 'ready to act'—so that imaging or thinking may become as true a want as food when hungry, or capture after a chase.*

It should be noted that the annoyingness due to the denial of action to a conduction unit ready to act differs essentially from the annoyingness due to action by an unready unit. In the case of the former (*e.g.*, the absence of other human beings,

*The facts noted in this paragraph will be stated more fully and more clearly in Chapter X.

lack of approving notice when amongst men, insomnia, or being held when desirous to pursue) the observable external behavior is of a restless, worrying, diffuse and aggressive sort; and the report of the person concerned of his internal state is of irritation, longing, and of an undefined lack. In the case of the latter (*e.g.*, tooth-ache, a cut, a blinding light, vile tastes and odors, or brain-fag) the externally observable behavior is much more often straightforward, restricted and defensive; and the person's report is much oftener of anguish, hatred and a specific repulsion.

Where, according to the hypothesis, denial of action to a ready unit is combined with forcing the action of another unready unit (as in the absence of food when hungry, the presence of work when exhausted, or in scornful treatment by men) the annoyingness often shows a mixture or alternation of these two varieties.

On the whole it seems best to assume, subject to further knowledge, the truth of this hypothesis that any state of affairs is originally satisfying which lets a conduction unit that is ready to conduct, do so, and that any state of affairs is originally annoying which forces an unready conduction unit to conduct or restrains from conducting one that is in readiness.

Ordinarily, then, any situation not only produces full action in certain conduction units, but also predisposes other units further on in the chain toward or against conduction. Thus the mechanism of even so simple a behavior-series as fixating a bright light, chasing a rabbit, or seizing and eating a berry is extremely complex. Such a complexity of excitants, checks and releases, as well as straightforward connections, is, however, exactly what human behavior requires and what the physiology of the neurones suggests. We have, therefore, the problem of deciding what original tendencies are found or put in readiness and unreadiness, by any given situation, as well as what bonds are aroused to immediate and total action by it.

The detailed solution of this problem for each important

situation I shall not attempt. In listing the readinesses and unreadinesses which different situations produce or call into play, psychology can at present make little advance beyond what any shrewd observer can see for himself once he understands the general principles. If each behavior-series is thought of as an army sending scouts ahead, or as a train whose arrival at any one station means the sending of signals on before whereby this switch is opened, that one closed, and the other left dependent on the size or speed or color of the train, —if the sight of a small object in indirect vision is realized as a cause of remote readinesses of the neurones connected with the fovea, the neurones concerned in reaching and grasping, even possibly of the neurones concerned in tasting,—enough has been accomplished for our purpose. To discover the exact nature of such readinesses is one of the notable tasks of the sciences of human behavior.

THE EXPLANATION OF 'MULTIPLE RESPONSE' OR 'VARIED REACTION'

One further general fact with respect to original annoyers and satisfiers requires mention. The details of very many of the forms of original behavior which have been and will be listed in this inventory involve *varied response* to an annoying state of affairs until a certain satisfying condition is attained. That is, the situation provokes, not one fixed response, but any one of several responses, the failure on the part of the one first made to produce a satisfying state of affairs being (in connection with the rest of the situation) the stimulus to one of the other responses, so that the animal does many things and does them over and over again until some one of them, or some external event, puts an end to the annoying state of affairs or brings the requisite satisfaction. Thus, in responding to an attractive object seen, a variety of reaching movements may be made until the contact with the object ends the series. The contact then sets off a variety of grasping movements until the

satisfying clutch of the object ends the series. The clasping of the object may then in turn set off a variety of retractions and flexions until the presence of the object in the mouth quiets these new cravings. Similarly, the situation 'being held' when the neurones concerned in running about are ready to act, provokes a variety of wrigglings, stiffenings, pushings and the like. The failure of any one of these to relieve the annoying confinement leads (in connection with the rest of the original situation) to a more energetic or different movement, the series being terminated when some one of the varied reactions ends the annoyance by securing escape. The process is easily observable in the behavior of the lower animals. A kitten which is utterly devoid of any acquired habits of response to the situation 'being confined alone in a small cage, when hungry, with food outside,' will respond to that situation quite instinctively as follows. "It tries to squeeze through any openings; it claws and bites at the bars or wire; it thrusts its paws out through any opening and claws at everything it reaches; it continues its efforts when it strikes anything loose and shaky; it may claw at things within the box. It does not pay very much attention to the food outside, but seems simply to strive instinctively to escape from confinement. The vigor with which it struggles is extraordinary. For eight or ten minutes it will claw and bite and squeeze incessantly." [Thorndike, '98, edition of 1911, p. 35.]

The importance of the original tendencies whereby the annoyingness of a certain state of affairs causes a series of varied movements until the required satisfier is produced* is very great, not only because of their number and frequent action, but also because of their very easy modification into special habits by the selection of the 'successful' response and its association with the situation. Variation is the first requisite for progress in the behavior of an individual as it is in the development of the race.

*Or until the animal is distracted from the situation, as by fatigue, sleep, or new sensory appeals.

CHAPTER X

Tendencies to Minor Bodily Movements and Cerebral Connections

The many original tendencies to movements concerned with the management of food after it is in the mouth, with breathing, excretion, the care of the eyes, teeth, nails and skin, the treatment of wounds and bruises, with rest and sleep, and with the component details of fighting, flight, hunting, the sex instincts and the rest need not be listed here. For various forms of special education such a list would be important. For example, a physician may profit from knowing that snuffling is original while blowing the nose is not, or that a pill on the extreme back of the tongue is originally far likelier to arouse swallowing than one on the front; and a teacher of boxing might profitably study the native responses to this or that attack. But for our purpose the space had better be kept for more generally significant tendencies.

VOCALIZATION, VISUAL EXPLORATION AND MANIPULATION

The apparently aimless vocalization, eye-movements, and manipulation of objects in play are, on the contrary, tendencies of the utmost importance.

A little child, apart from training, makes all sorts of movements of the vocal cords and mouth-parts resulting in cooings, babblings, yellings, squealings and squawkings of great variety. He moves his eyes so as to bring different parts of any object which attracts visual attentiveness upon the fovea. He pulls, pokes, turns, picks up, drops, shoves, rolls, scratches, waves, and otherwise manipulates an object that permits it.

This behavior is characterized, at least to superficial ob-

servation, by aimlessness, ubiquity, and indiscriminateness. The movements seem to do nothing for the animal, to be made to any one situation (of a certain class) as well as to another, and to be made hit-or-miss in any order. Vocal play seems to occur with no ulterior consequence. Any stimulus from without or within, which does not connect with some antagonistic vocal activity, seems to evoke it. One sound or another, one sequence of sounds or another, seems to occur indifferently. So, also, the manipulation of objects under consideration seems quite without an ulterior end such as the 'reach-grasp-put in mouth' responses display. It seems to be a response to *any* object that permits it; and turning, poking, scratching seem to occur as fortuitous emergences from a set of indifferent responses. A general tendency to aimless exercise of the neurones controlling the movements of the eyes, vocal apparatus and free forelimbs seems thus a just description of the tendency.

For a rough and elementary description it *is* just. But a more critical consideration of the behavior will show that it is conformable to the general type of a connection of a definite response with a definite situation, perpetuated in inheritance by its utility.

All original tendencies are aimless in the sense that foresight of the consequences does not effect the response. The animal does not originally run from a tiger because he intends to get away. He runs because of the tiger and because running in that situation is a satisfier to his neurones. He equally fingers the block because it is what it is and because fingering it satisfies him. As to the aim seen *ab extra*, the end as gained rather than as foreseen, no instincts have surer utility than the apparently objectless voice-, eye-, and finger-play. For the end of voice-play is language; the end of eye- and finger-play is knowledge. In the long run, the apparently random voice-play is more useful to the species than the specific calls of hunger, pain, fright, protection and wooing; and the puttering with eyes and fingers is more useful than the movements of flight, pursuit, attack, capture and eating. What might ap-

pear to be perverse luxuries in the business of keeping one's self and one's offspring alive, turn out to be, in connection with certain other tendencies, means of exterminating all enemies, securing food in regular abundance, and remaking the environment to suit man's almost indefinite multiplication.

The definiteness of the situations and responses would be revealed if observation could include what goes on in the nervous system as well as in more external behavior. The apparent identity of the response to different things (as when a child prattles alike to his mother, his doll, and the sky), and the apparent indiscriminateness of the selection from poking, pulling, scratching, and so on in response to apparently the same thing, would then be seen to be illusions. The inner action of nutrition, fatigue and growth plays here a larger part in deciding which of the many possible movements shall be made, than it does in the case of flight or fighting, and so justifies the rough usage of the term 'multiple response to the same situation.' The situation, too, may be, in addition to the proper inner conditions in the neurones, so general as 'anything that contrasts with the rest of the visual field' or 'anything touching the palm of the hand' or even simply 'being alive, awake and with one's vocal apparatus not otherwise engaged.'

Vocalization, visual exploration and manipulation are then to be described as general tendencies to random exercise of the neurones concerned in making many sounds, many eye movements and many manual experiments only if we mean by general and random this particular generality and randomness. When Spencer and others speak of 'excess' movements or the 'overflow of nerve energy' into 'all sorts of' movements or the 'chance' action of the muscles of speech, facial expression, gesture and manual play, they are not describing the facts of early motor play accurately. These movements are in excess of those needed for eating, fighting and the like, but they are as grounded in fundamental tendencies of the organism as the latter. It is not that the nerve energy of man (and in some measure of the monkeys) *over*-flows as that of fishes and many

mammals does not, but that it flows into some hundreds of channels productive of movements of the vocal cords, mouth-parts, facial muscles, eyes and hands, as it does not in a fish or mammal. The actions are 'chance' ones only in the sense that observation of the external situation alone can not predict them nearly so well as it can the actions of eating, flight or attack. They do not even *seem* to be *perfectly* random. We can at least predict that an infant will say 'ah goo' at an earlier age than he will say 'ĭ dä,' that he will pat an object far oftener than he will place his little finger on it, and many other facts of the same sort. We can predict with very great surety that a child will not roll his eyes independently at a toy or grasp it with his thumb and ring-finger. The randomness is, in any case, limited to the choice from among certain responses which, as a total group, are thoroughly defined.

Lest this somewhat subtle discussion of the more exact description of these tendencies distract attention from the sheer external behavior, I repeat that vocalization means, roughly, the responding by many different sounds in many different sequences to many different external situations, and that from it develop, under training, speech, song and other vocal arts. Visual exploration means, roughly, responding by many eye movements so as to bring various parts of an object upon the spot of clearest vision, and from it develops much in our perceptions of 'things,' our habits of purposive examination, reading and the like. Manipulation means, roughly, responding by many different arm, hand and finger movements to many different objects, and gives the possibility of the habits of using tools, writing, drawing, and the bulk of modern skilled occupations.

OTHER POSSIBLE SPECIALIZATIONS

Constructiveness.—In the ordinary descriptions of original tendencies by the consequences to which they lead, 'destructiveness' and 'constructiveness' occupy prominent places. This apparent contradiction is due simply to the impropriety of de-

scribing a tendency by its consequences instead of by the actual situation and response. Original nature knows nothing of destroying or creating—of changing an object into a status less or more profitable to the welfare of the world in general. Its tendency is simply to manipulate objects in the fashion that has just been described. With this go the satisfactions of doing something rather than nothing, of getting a more varied and novel series of impressions, and of having acts produce perceptible changes, which are taken account of under the proper instinctive interests. Waving of arms and legs, kicking and rolling, grimacing, prattling, dropping toys, blowing whistles, tearing books, digging holes in the sand, and building with blocks are all of the same pattern. No one would think it proper to speak of instincts of constructing and destroying the air in the sense of making words and making senseless jabber. One word, vocalization, is wisely used to describe the tendency to make babbling movements. So one word, manipulation, may replace constructiveness and destructiveness to signify the tendency to make certain hand, arm and finger movements.

Cleanliness.—James ['93, vol. 2, p. 434f.] thinks it probable that there is "a primitive impulse to clean one's self," but perhaps cleanliness is not the best name for the tendency to be annoyed by sticky and slimy stuff on the hands and to wipe it off on anything handy, commonly the body itself or what happens to be covering it! That is about as far as original 'cleanliness' goes. It is instructive to note that the mysophobia or dread of foulness in some insane people, which James takes to be "the convulsive exaggeration" of an original impulse to cleanliness, is almost always to wash the *hands*—not the face or feet—"a hundred times a day." There are tendencies to 'lick one's chops,' to pick at scabs, to free the teeth by tongue or finger from objects stuck between them, to rub one's fingers between one's toes and to bite one's nails, which are, perhaps, homologous with animal cleanliness, and like it better named *tendencies to care for the skin and mouth-parts.*

Adornment and Art.—Kirkpatrick and others think that there is an original specific tendency to adorn one's body. But it seems more probable that painting, tattooing, decoration with shells, flowers, clothes, feathers and the like are all learned responses selected by their value in connection with gaining notice, approval, mastery, and success in courtship.

The originality of a specific tendency to make beautiful objects may also be doubted. Constructiveness of all sorts seems to be the result of experience acting on general manipulative play. Habits of making admired, rather than unnoticed or disliked, objects would easily be selected for survival. This, I judge, is all that Marshall really claims in his statement that the "art-impulse" is a "blind impulse leading man to *create* with little or no notion of the end they have in view . . . a common heritage for all members of our race." ['94, p. 101.] This original 'art-impulse,' he continues, is for man "to use his surplus vigor in crude attempts . . . which, *in their developed form,* [italics mine] give us our best art products." Hirn, who has made the most acute study of the origins of art, finds them chiefly in "the instinctive tendency to express overmastering feeling, to enhance pleasure, and to seek relief from pain," laying especial emphasis on the tendency to engage in mental activity for its own sake, which, following the traditional psychological terminology, he describes as "a yearning after increased consciousness, which leads us to pursue, even at the risk of some passing pain, all feelings and emotions by which our sensation of life is reinforced and intensified." ['00, p. 73.]

CURIOSITY AND MENTAL CONTROL

Curiosity.—Many of the constituents of what is vaguely called instinctive curiosity have already been listed. Attention to novel objects and human behavior (pp. 46 f. and 88), cautious approach (p. 65), reaching and grasping (p. 50), the food-trying reactions of putting in the mouth, tasting and biting, general exploration with the eyes and manipulation with

the hands (pp. 51 and 135) are the responses which, in connection with the situations that evoke them, make up a large part of so-called curious behavior.

The element not hitherto listed may best be named the love of sensory life for its own sake. Merely to have sensations is, other things being equal, satisfying to man. Mental emptiness is one of his great annoyers. We may justly picture the brain of man as containing many neurones, in connection with the sensory neurones, which crave stimulation—are in "readiness to conduct"—though no immediate gratification of any more practical want follows their action. Man wants sense impressions for sensation's sake. Novel experiences are to him their own sufficient reward. It is because they satisfy this want as well as because of their intrinsic satisfyingness, that visual exploration and manipulation are the almost incessant occupations of our waking infancy.

The Instinct of Multiform Mental Activity.—The hypothesis that man's brain contains many neurones in 'readiness to act' besides those whose action is concerned in the behavior-series of the specific instincts must, I think, be carried further. There are not only neurones ready to be set in action by direct stimuli from the sense-organs, but also neurones ready to be set in action by more remote or secondary connections. For example, a baby likes not only to see a pile of blocks tumble or a wheel go around, but also to find the blocks tumbling *when he hits them,* or the wheel revolving *when he pushes* a spring. Satisfactions of the second sort are, indeed, if anything the more potent. Merely hearing the toot of a horn is a feeble joy compared to blowing it. Now 'tumbling when I hit them,' 'whirling when I push,' and 'tooting when I blow' are samples of *secondary* connections, a step removed from mere sensations. They represent the action of the neurones concerned in the child's manipulations, those concerned in his sensations and *those concerned in connecting the latter with the former.* They possess the satisfyingness of manipulation, of the love of sensory life *per se,* and something more, which, for lack

of a better name, I shall call the *satisfyingness of mental control.* To do something and have something happen as the consequence is, other things being equal, instinctively satisfying, whatever be done and whatever be the consequent happening.*

Now mental control, or doing something and having something happen, is satisfying in *very many concrete forms.* Not only making movements and thereby getting sensations, but also making an ideal plan and thereby getting a conclusion, making an imaginary person and thereby getting further imaginations of how he would act, and countless other 'gettings from doings,' are satisfying. They are originally satisfying since, as soon as training gives the ability to make the plan or image and get the result, nature gives satisfyingness to the connection.†

No assumption whatever of teleology or of prearranged favoring of such conditions as later life requires is involved in the satisfyingness of doing something and having something happen. I should, for example, replace in Lindley's description ['97, p. 436] the italicized words by those in parentheses.

"Let it be called a general impulse or instinct to exercise the *intelligence as such* (secondary neurone connections). Such a gymnastic *must consist* (consists) in the most widely various sorts of activity, a deployment as far as possible of all resources of body and mind in ways which *are to be of use later* (are determined by the excitability of conduction units apart from those concerned in the more specialized instincts.)"

Mental activity is then, other things being equal, satisfying almost or quite in general. The neurones concerned in the

*This is, I judge, the fact which Groos and others have in mind, or should have in mind, when they speak of man's instinct of 'pleasure at being a cause,' or of 'experimentation.' A typical illustration of the earlier appearances of such behavior is the following from Shinn ['99, p. 10]: "In the twentieth month she would often cover her eyes with her hands and take them away; hide her face in a cushion, or on her own arms, often saying, 'Dark,' then look up,—'Light now.'"

† The *'other things being equal'* is of course implied throughout. Making a connection that has to be made against strong cravings to rest or to do something else may be very annoying.

special instincts are not the only ones in readiness to act. Neurones are roused to action in the course of learning which also were ready to act and whose action therefore is satisfying. It is as instinctive or 'natural' for certain men to enjoy the unforced exercise of thought and skill as to enjoy food, sleep, companionship, approval or conquest.

The Instinct of Multiform Physical Activity.—A similar line of observation and reasoning justifies the conclusion that, other things being equal, many unforced movements besides those specifically made in response to food to be got, foes to be subdued and the like, are originally satisfying. It is as instinctive for the baby to curl its toes, wave its arms and wriggle its head as to suckle. The boy instinctively enjoys a gymnasium as well as chasing cats. The grasping, chasing, wrestling and pulling in response to the real situation of the hunt doubtless have a richer zest than the club-swinging or fancy tumbling done, as it were, in a biological vacuum, but what satisfaction they do give may be instinctive. After long rest almost any unforced movement is more satisfying to the child than further inaction would be.

The Instinct of Workmanship and the Desire for Excellence.—The gifted economist Veblen uses as a pillar for his doctrines of human productive labor the existence of an "instinct of workmanship" which he defines as follows:—

"He (man) is an agent seeking in every act the accomplishment of some concrete, objective, impersonal end. By force of his being such an agent, he is possessed of a taste for effective work, and a distaste for futile effort. He has a sense of the merit of serviceability or efficiency and of the demerit of futility, waste, or incapacity. This aptitude or propensity may be called the instinct of workmanship." ['99, p. 15.]

Such a tendency surely comes to exist in very many men under the ordinary circumstances of life, and may properly be used in economics as a postulate, but it is a complex of several sets of original connections and of their guidance by material and human surroundings. Chief among the former are the tendency to multiform physical and multiform mental activity

just described, the satisfyingness of mental control and of human approval, and annoyance at being thwarted and at human contempt. Amongst the guiding factors are objects to be duplicated, ends to be gained and the human customs of approving certain products of intellect or skill and condemning others. Thus the child who fumbles with blocks, content with producing any effect, almost universally comes to be a boy who is satisfied by only such effects as approximate an ideal of his own.

The same sort of account may be given of the "desire for excellence for its own sake" of which Alfred Marshall says:—

" . . . The desire for excellence for its own sake graduates down from that of a Newton, or a Stradivarius, to that of the fisherman who, even when no one is looking and he is not in a hurry, delights in handling his craft well, and in the fact that she is well built and responds promptly to his guidance . . . A large part of the demand for the most highly skilled professional services and the best work of the mechanical artisan, arises from the delight that people have in the training of their own faculties, and in exercising them by the aid of the most delicately adjustable and responsive implements." ['90, vol. 1, p. 147.]

This potent mover of men's economic and recreative activities has its tap-root in the instinct of multiform mental and physical activity.

PLAY

No doubt much of the behavior called play represents original bonds between certain situations and certain responses. Play, in any one of the common meanings of the word, is more original, less a product of training, than the occupations which are distinguished as work. But, as has repeatedly been the case with other tendencies, the vague assumption of a tendency to manifest, apart from training, more or less of the behavior called play, needs specification. The majority of the disputes about the service of play in education hark back to vagueness in defining what play is to be taken to mean; and in deciding

which elements in it are original and which are learned. It is therefore well to remind oneself first of all of what the original tendencies to play are *not*.

There is no original tendency to act uselessly rather than usefully, or to make-believe rather than to accept matters of fact. Nor is there a full set of tendencies to mock in a sportive way all the separate behavior-series of feeding, hunting, seeking shelter, running away, and so on which have been listed in this and the previous chapters. Man has not two original natures—one matter of fact, the other playful,—from one to the other of which he shifts by inner magic.

The majority of the original tendencies from which human play develops are not peculiar to play, but originate serious activities as well. Such are manipulation, facial expression, vocalization, multiform mental activity and multiform physical activity. The same original tendency, manipulation, is the root of making mud-pies and apple-pies. Vocalization produces matter-of-fact, utilitarian speech and playful screams or songs. To explain the greater part of original play, no additions whatever to the account of original nature so far given are needed.

Another fraction of original play is accounted for by the fact, which was mentioned in Chapter II and which will be discussed later, that the original tendencies so far described for convenience as if they manifested themselves in distinct unitary situation-response series, do not in life come thus neatly separated. Any situation in life may be enormously complicated, so that a mixture from responses of, say, curiosity, hunting, kindliness, and manipulation may be its result. A two-year-old child may be to a six-year-old child, at one and the same time, a novelty, a small object passing him, a fellow-man, and a stimulus to secondary connections, and so may be stared at, run after, patted and felt of. So the six-year-old may not hunt and subdue, nor feed and protect, but, as we say, 'play with' the baby. Any situation in life may be only a fragment—in the artificial life of civilization, a mutilation—of any of the total situations to which original nature is previously adapted.

Consequently, it may produce only a fragment of the response which the total situation would have produced. A dig in the ribs, unpreceded by threatening approach and unaccompanied by projected head, angry face, growling and snarls, *must* call forth a different response from that which it would call forth if with these accompaniments.

In a similar way the 'mutilation' of the conditions within the organism may give to a tendency an appearance of being playful beyond its deserts. If infants from a year to three years of age lived in such a community as a human settlement seems likely to have been twenty-five thousand years ago, their restless examination of small objects would perhaps seem as utilitarian as their father's hunting.

There are left, as possible instincts of play proper, not already listed, the special tendencies to hunt for hunting's sake in ways notably different from the 'real' hunt; to fight for fighting's sake in ways notably different from the 'real' fight; to fondle and pet in ways notably different from the 'real' mothering. It may be, that is, that in these cases nature provides preparation for food-getting, for the struggle for females and for motherhood by connecting special play-responses in early life to situations like, though not identical with, those to be met in earnest. Whether the chasing, fleeing, catching, wrestling, jumping upon domestic animals and other children, fisticuffs, hair-pulling, and the like, and the holding, fondling and petting babies, dolls, pets and toys, by the young, require such special instincts or are explainable as the 'real' instincts, modified by complication or distortion of the situations and by training, I shall not try to decide. In any case, in playful hunting, fighting, mothering, fleeing, home-making and the like, training early permeates and overlays man's original nature.

RANDOM MOVEMENTS

Of the 'varied reactions' which were discussed in the preceding chapter, some have not been shown to be definitely bound

to any one particular situation. Of the minor bodily movements of vocalization, visual exploration, manipulation and doing something to have something happen described in this chapter, many seem to be evoked by merely being alive, awake, energetic and in the presence of something or other. Of the sprawlings, kickings and finger movements of the first four months, many seem, at least to ordinary observation, to come for no particular reason.

Such facts have led to the assumption that a smaller or larger fraction of human behavior is 'undetermined,' 'random,' 'diffuse,' or 'spasmodic.' Baldwin expressed the orthodox view of twenty-five years ago when he wrote: "Such reactions which are simply the discharges, the outbursts of the organism, independent of definite external stimulation are called spontaneous. So the incessant random movements of infants and the extraordinary rubber-like activity of the year-old child." ['91, p. 303.] The following quotations from recent standard books show that this view is still current, though tempered somewhat in its expression. In speaking of the movements which an infant makes when "a bright and noisy rattle is presented to the notice of a child," Angell writes: "At first these movements are inevitably spasmodic, vague and uncoördinated. They simply suggest, as we observe them, some sort of explosion in the motor centres." ['04, p. 349.] Pillsbury ['08, p. 155] says: "A certain number of responses are predetermined at birth by the racial acquirements of instinct, but in man and the higher animals a vastly greater number of movements are possible from the side of the nervous connections than are fixed or predetermined." Colvin writes, with similar caution, that: "The higher forms also possess at birth certain diffuse and uncoördinated reactions that seem to serve no immediate purpose, since they are not definite enough to bring about any helpful adjustments. An example of these latter reactions may be found in the ill-directed and seemingly wasteful movements of the infant, who on seeing a brilliantly colored ball suspended before it, makes a multitude of movements, none of which

may accomplish the result of obtaining the ball. The visual stimulus of the colored ball sets up in this particular instance a nervous activity that finds no direct and definite discharge, spreading itself over the entire nervous system. . . ." ['11, p. 9.]

Early in this volume it was shown that human behavior could not be random in the strict sense. Nothing in the world is so. Nor do these writers intend to give that impression. They do, however, give, and probably intend to give, the impression that irrelevant internal happenings, casualties of the nervous system, play a considerable rôle in causing the variety of human behavior. The words *spasmodic, explosive, not fixed, not predetermined, diffuse, uncoördinated* and *indefinite* also give—whether by the writers' intention or not—the impression that, in the case of many situations, any selection from a very great many conduction units is as likely to be set in action as any other selection, the external situation itself having no appreciable original bonds.

The words *random, diffuse, indefinite* and the like are so very economical as descriptions of certain features of varied response, general mental and physical activity, and the early infantile gymnastics that anybody is tempted to use them and is easily excusable. It is also a delicate task to decide whether the results of the irrelevant internal happenings are considerable or inconsiderable, whether one should give the impression that one situation can provoke 'any' selection from 'a very great number' of conduction units or 'certain' selections from 'many,'—whether an external situation has no *appreciable* bonds or no *emphatic* bonds. But I cannot avoid the conclusion that such statements as those quoted above, and such as I have myself been guilty of in earlier writings, do mislead. The 'rubber-like activity of the year-old child' is, I believe, instigated by the appeal of external objects and directed step by step by the satisfactions which arise from specific sights, sounds, touches and movements. The baby's response to the rattle dangled before it does not suggest to me an explosion in

the motor centres, but only a rich and changing, but perfectly definable, response-group which does have a constant relation to that sort of a situation. The response to the rattle seems vague if it is compared with some single stereotyped instinct; but it seems definable, indeed very limited, if it is compared with all the baby's repertory or with what an actual brain explosion might be supposed to produce. For example, let the four-months-old child be presented with the rattle, the breast or bottle, a sharp slap, or a rhythmic rocking. The four responses would be confused by no one. Or consider that it never does what it should do from sheer diffusion of the conduction. No child ever responds to a dangling rattle by one-tenth or even one-twentieth of his total repertory.

After all, while the more variegated and unstable connections are certainly not 'fixed' or 'predetermined' in the sense that each situation is married to some one response, their divorce being a rare and serious matter, no more are they diffuse or indefinite in any strict sense of those terms. Whatever use rhetorical necessities may direct of the phrases 'random responses,' 'general mental and physical activity,' 'varied reaction' and the like, the student of human nature must bear in mind just what the peculiar limited randomness, generality, or variety is. What it is, I have tried to describe and illustrate in the course of this inventory.

CHAPTER XI

The Emotions and Their Expression

DIFFICULTIES IN IDENTIFYING AND STUDYING EMOTIONAL STATES

It has been noted from time to time in the course of this inventory of man's original nature that certain situations arouse in the neurones responses productive of the inner states of fear, elation, depression, and the like. Rather scant justice has so far been done to the problems of what particular neurone action of this sort, and so what inner emotional state, any given situation will originally provoke; and to the general problem of the nature of these neurone-actions, and their original status.

Theoretically we could parallel our inventory of the bonds between what may happen to a man and what he will, apart from training, do in response thereto in the way of running, smiling, crying, striking, being satisfied or annoyed and the like, by an inventory of the bonds between what may happen to him and what his neurones will do in the way of action productive of excitement, calm, elation, depression, tenderness, fear and the like. But practically, although more attention has been given by psychologists to the latter than to the former division of man's instinctive equipment, such an inventory is very unsatisfactory. Since some of the reasons for its unsatisfactoriness are bound up with the general problem of the nature and original status of the neurone-actions concerned, the concrete problem of a detailed inventory may be held over until certain facts about the general problem have been reviewed.

The neurone actions concerned with the emotions have been

asserted by James ['93, Chapter XXV]* and Lange ['85] to be in large measure secondary results of bodily disturbances outside the brain. Such bodily responses as the secretion of tears, the rush of blood to the head, or the fluttering of the heart are supposed by the James-Lange theory to react upon the neurones to produce conditions in them which, in part, account for tender, angry and fearsome feelings.†

Opponents of the James-Lange theory, so far as they are clear about the neurone-actions to which original emotional states of consciousness are due, maintain that they may be caused directly by the situation—sensed object or thought-of fact—without the arousal beforehand of any response outside the brain. This conflict of opinions remains unsettled.

The significance of this disagreement for us lies in the proof it gives that almost nothing is known of the neurone-action concerned in producing any emotion. If men knew what the neurone-action was in any case, they could easily decide experimentally whether, in that case, it did or did not have a certain condition outside of the brain as its antecedent. As it is, they can only call such the *x* producing fear, the *y* producing tenderness, or the *z* producing elation.

But the fear, tenderness or elation itself is definable only as that which a man feels when he is in certain situations or as that which a man feels when he makes certain responses. In spite of thousands of pages of introspective analysis we are always brought around in the end to the statement that, say, fear is 'what I experience when something is there, which other men or I, myself, would say caused me to fear,' or 'what I expe-

*The theory described here was first broached by James in an article published in *Mind*, in 1884, and by Lange independently in '85. James' discussion is repeated in Chapter XXV of the *Principles of Psychology*. Lange's discussion is available in the translation by H. Kurella ['87], entitled *Ueber Gemüthsbewegungen*. Kurella does not give the title of the Danish original.

†For a conservative account of what little is known of the internal bodily conditions which go with, and perhaps are the causes of, certain conditions of the neurones productive of the feelings of excitement, anxiety, anger and the like, see Ladd and Woodworth ['11, pp. 500-528].

rience when I honestly report myself in words to be in terror, or make some grosser response to the same effect.'

This definition or identification of an inner conscious emotional state as the unknown quantity of an unknown stuff that is produced by a certain situation or evidenced by a certain response may, of course, be delayed by comparing and contrasting the unknown with other unknowns of the same class. Thus fear may be defined as a shocking, depressed state of mind, or as the opposite of confidence and courage, or as more like grief than anger is. But a demand for identification of these means of definition themselves leads finally always to the provoking situation or the attendant response.

So in a circle one goes from objective situation to objective response without laying one's grasp on anything to think about as fear, or tenderness, or elation, save the state of mind one has as a sequent of a certain situation or as a precursor of a certain response.

Just as the neurone-action productive of fear is the x, producing fear, so fear is the x_1 produced by such and such situations or the x_2 productive of such and such verbal report or grosser response. If a thousand men of science had observed all the millions of cases of this inner fear that have happened in the last ten years, they would still be unable to do any more with it than to define the objective conditions and consequences of its appearance. The cavalier treatment accorded to these states of consciousness and to the conditions in the brain to which they are due, in the case of fear and anger, and their total neglect in the case of curiosity, play, mastery and submission, motherly behavior, kindliness and other original tendencies, is then in part justifiable.*

*The reader who has accepted the verbal assertions of the traditional analytic psychology at their face value may suspect that I have been unfair in reducing the traditional descriptions of 'emotions' to comparisons or contrasts *inter se* and to references to the situations which cause them or the varieties of bodily behavior which accompany them. He may retain a conviction that some direct apprehension of the nature of

It would, perhaps, not be wholly justifiable. For what a man reports as his emotions are signs of the existence of neurone-actions which, though unknown so far as concerns their own make-up, are known, so far as concerns their *connections* and their *meaning*. The less easily observable effects on the brain productive of the states of consciousness called emotions can enter into connection with other facts, serve as intermediate links between a situation and further responses to it, and become themselves situations to which responses are bound. They, or the feelings going with them, can lead to attitudes and actions toward situations—can stand for or 'mean' various states of affairs. Just as the sound, heard or imagined, of the word 'run' can represent or mean certain facts, so the feelings of fear can represent certain facts—certain attitudes and possibilities of the man's behavior. The less easily observable effects of situations on the brain, whether they parallel so-called sensations or so-called emotions, serve as *means of connection* and have *representative value*. Suppose, for example, that when I think I have lost a thousand-dollar bill, there occurs a 'less easily observable effect in my brain' producing the same feeling that was a part of my condition when clutched by the neck in the dark, but without the bodily start, jump and trembling. This 'less easily observable effect on my brain' may connect with its former associates, leading me to call my present condition by the same name as that given the previous total condition by those around me: it may connect with associates of all sorts leading me to regard whatever causes it as 'fearful' or 'dangerous.'

Just as the fact that the 'less easily observable effects on the brain' due to light vibrations of different wave-lengths are different, gives a means of convenient ordering and planful representation of certain facts of nature, so the fact that the 'less easily observable effects of the brain' of jumping tigers,

the feeling of fear or anger or scorn is possessed and communicated by psychologists. This conviction can hardly remain in any matter-of-fact student who will re-read the descriptions written by experts in such supposedly direct apprehension of conscious states.

of wailing babies, and of scornful looks are different, gives a means of convenient ordering and planful representation of certain other facts of nature.

The amount of value of the 'emotions' as centers of connections or carriers of meaning is of course far less than that of 'sensations,' but they possess the possibility of the same sort of value. Since the use of the emotions in this way is chiefly a matter of acquisition, further discussion of this topic belongs to a later volume on the *Psychology of Learning*.

MCDOUGALL'S INVENTORY OF ORIGINAL TENDENCIES TO EMOTIONAL STATES

I am unable to satisfy myself which particular x's, y's and z's of the emotional states would, by original nature, appear in response to the concrete particular situations of life so as to give an inventory of original bonds in this field that seems suitable to the purposes of this volume. For the sake of those who feel that they know just what inner states are meant by the words 'fear,' 'wonder,' 'tender emotion,' and the like, the inventory of McDougall—an able psychologist who is specially attentive to just this problem—is summarized here, though to me it seems to make little advance beyond common knowledge toward prophecy of what men will feel apart from training.

McDougall finds that the original responses of inner emotional states are seven in number—fear, disgust, wonder, anger, subjection or negative self-feeling, elation or positive self-feeling, and tender emotion. "From these seven primary emotions together with feelings of pleasure and pain (and perhaps also feelings of excitement and of depression) are compounded all, or almost all, the affective states that are popularly recognized as emotions, and for which human speech has definite names" ['08, p. 81 f.].

The situations which originally provoke these seven responses are:—

For fear.—"A variety of objects and sense impressions,"

which in the case of man "it is difficult to discover." "In most young children . . . any sudden loud noise . . . and all through life such noise remains for many of us the surest and most frequent excitant of the instinct." "Other children, while still in arms show fear if held too loosely when carried downstairs, or if the arms that hold them are suddenly lowered. In some, intense fear is excited on their first introduction at close quarters to a dog or cat, no matter how quiet and well-behaved the animal may be; and some of us continue all through life to experience a little thrill of fear whenever a dog runs out and barks at our heels, though we may never have received any hurt from an animal and may have perfect confidence that no hurt is likely to be done us. . . . In other persons, again, fear is excited by the noise of a high wind, and though they may be in a solidly built house that has weathered a hundred storms, they will walk restlessly to and fro throughout every stormy night . . . Of all the excitants of this instinct the most interesting, and the most difficult to understand as regards its mode of operation, is the unfamiliar or strange as such. Whatever is totally strange, whatever is violently opposed to the accustomed and familiar, is apt to excite fear both in men and animals, if only it is capable of attracting their attention."

For disgust.—"Substances that excite the instinct in virtue of their odor or taste, substances which in the main are noxious and evil-tasting" and "the contact of slimy and slippery substances with the skin."

For wonder.—"Any object similar to, yet perceptibly different from, familiar objects habitually noticed."

For anger.—"It has no specific object or objects the perception of which" provokes it. The situation which originally arouses it is "any obstruction to the activity to which the creature is impelled by any of the other instincts."

For elation or positive self-feeling.—This "is only brought into play by the presence of spectators." "The situation that more particularly excites this instinct is the presence of spectators to whom one feels oneself for any reason, or in any way, superior."

For subjection or negative self-feeling.—McDougall does not state what the stimulus is, but by inference it would be the presence of spectators to whom one feels inferior.

For tender emotion.—"The child's expression of pain, fear,

or distress of any kind, especially the child's cry of distress; further . . . the cry, not only of one's own offspring, but of any child." By association by similarity, other objects such as a happy but frail child, "any very young animal especially if in distress," and the like may directly arouse this response.

When a situation contains elements which arouse two or more of these primary responses the two or more compound to become "mixed, secondary or complex emotions." "The great variety of our emotional states may be properly regarded as the compounding of" these seven primary responses. This is "largely, though not wholly due to the existence of sentiments," a *sentiment* being an "organized system of emotional tendencies centered about some object." "Since the primary emotions may be combined in a large number of different ways, and since the primaries that enter into the composition of a secondary emotion may be present in any different degrees of intensity, the whole range of complex emotions presents an indefinitely large number of qualities that shade imperceptibly into one another without sharp dividing lines. The names provided by common speech designate merely a certain limited number of the most prominent of these complexes."

Admiration is essentially a compound of "wonder and negative self-feeling or the emotion of submission" and so should be excited originally by "any object similar to, yet perceptibly different from, familiar objects habitually noticed" when other human beings to whom one felt oneself inferior were present.

Gratitude "is a binary compound of tender emotion and negative feeling" and so should be originally the emotional response to a "child's expression of pain, fear or distress of any kind" when other human beings to whom one felt oneself inferior were present.

Scorn is a compound of disgust and anger ("when an object excites our disgust, and at the same time our anger, the emotion we experience is scorn"), and so should be the original response to "substances that excite the instinct in virtue of their odour or taste" and "the contact of slimy and slippery substances with the skin" provided that there is "any obstruction to the activity to which the creature is impelled by any of the other instincts."

Loathing is a compound of disgust and fear and so should be the original response to a situation like that just described,

but with the second feature replaced by a "sudden loud noise," "a high wind," "the unfamiliar or strange as such," or the like.

In the case of *Envy* McDougall "would suggest that it is a binary compound of negative self-feeling (that is, subjection) and of anger." He apparently judges that a certain amount of reflective consideration is necessary to the production of envy, so that he would perhaps not claim that the sheer presence of spectators to whom one feels inferior *plus* an obstruction to our own activity would evoke envy.

Reproach "seems to be a fusion of anger and of tender emotion."

Anxiety is anticipatory pain mingled with tender emotion.

Jealousy is a compound of anger and tender emotion under some painful check.

Vengeful emotion is essentially a fusion of anger and wounded self-feeling.

Bashfulness is a compound of elation and subjection, but "a struggle rather than a fusion."

Shame "is bashfulness qualified by the pain of baffled positive self-feeling (*i. e.*, elation), whose impulse is strong and persistent owing to the fact that the emotion is excited within the system of the self-regarding sentiment."

THE RELATION OF EMOTIONS TO THE MOVEMENTS WHICH EXPRESS THEM

The emotions (or the hidden conditions of the organism paralleling the emotions) have a further interest in connection with the origin of the customary and misleading psychology of certain instincts. Since these internal responses of the brain itself are, for others than the one making them, hard to observe, reward and punish, they have to be controlled indirectly by rewarding or punishing the obvious bodily conditions with which they are commonly found. As a result, they may stay as fairly stable cores in the total responses of fear, anger, or disgust, while the more obvious running, hiding, striking, biting, spitting and shrinking are omitted or variously modified. Thus arose the traditional, but perverse, description of such

sorts of behavior as 'states of consciousness which are *expressed* by bodily activities.' The original nature of man is pictured as a set of tendencies for various situations to arouse, first in time and first in importance, the feelings—fear, anger, disgust, interest, pity, love, and the like. Each of these feelings then receives by heredity, or seeks out more or less miraculously, certain bodily movements to go with it. The service of these movements is to express or make known the existence of their respective feelings.

This description is perverse through and through. The arousal of the feelings of fear, anger and the like is first neither in time nor in importance. The more observable bodily movements do not come as expressions of them, but as responses toward the outside situation that started the behavior-series in question. The service of the bodily movements of facial expression, cries, tears and the like is to *make a difference in the behavior* of other men, or occasionally of other animals, or in the responding person himself. In the course of the modification of the behavior of the other human beings who witness the cries, tears, etc., they may think of the conscious state of the wailer, but that is a secondary by-product of the process.

The error just described has been extended, though at the same time softened by vagueness, in the doctrine of a general *Instinct of Self-expression.* Kirkpatrick ['03, Chapter XIII] has affirmed definitely, what doubtless many students of human nature are inclined to believe, that man originally expresses his mental states to others of the same species and takes pleasure in doing so. This is a misleading statement. It is true that many conditions in a human being, such as hunger, bodily pain or disgust, are connected with facial movements, cries and gestures which an experienced human being can interpret and to which an inexperienced human being responds adaptively. But it is not true that there is a general tendency to so reveal any mental state whatsoever. Love affairs are concealed. Shy behavior conceals in part whatever fear, affection, hatred

or disgust may be present. The trembling and paralysis of fear may 'conceal' an intense desire to run away. Whether one sees colors normally or as the color-blind do, whether one is thinking of six or sixteen, in fact the great majority of individual peculiarities in perception and thought which make up perhaps nine-tenths of human mental states today, are not, by original nature, expressed at all save in alterations of the neurones unseen by others of the same species.

Common as is the tendency to speak out what is in one's mind, it can be explained as the result of learned habits initiated by the instinct of vocalization and selected by reason of their ulterior satisfyingness. Man talks in order to get the satisfaction of mental control, material favors, notice, approval and other goods, quite irrespective of spreading information about himself. A little later he talks to himself or aloud partly also in order to think. Let the others of the same species refuse his verbal requests, scorn his autobiography and let his musings grow richer and more fluent when made silently, and he becomes taciturn.

What original human nature shows is not a general tendency to self-revelation, but a multitude of special responses by facial movements, gestures, cries and gross bodily movements which act as potent situations to evoke attention and various adaptive responses from others of the species. These responses by the others are not simply awarenesses of the state of mind of the first party. They vary according to whether the second party has the mothering, friendly, mastering, submissive or other tendency acting at the same time. Nor are they primarily awarenesses of the first party's states of mind. On the contrary the primary thing is to chase the foe who flees, to cuddle the infant who wails. So mammals and birds, who show no signs of a general appreciation of the states of mind of their kind, yet respond adaptively to them.* The so-called

*Craig has found that the instinctive uses of the voice by pigeons are potent means of social control; Ordahl notes in the case of the feeding of young that, "with all the birds observed, the ones that called the loudest and most frequently got the most food." ['08, p. 494.]

expressive movements are of great importance as means of social coöperation and control, but, apart from learning, they act by provoking motor responses directly, not by exciting awarenesses of the mental states of others.

THE ORIGINAL BONDS OF THE EXPRESSIVE MOVEMENTS

Some of these special responses by facial movements and cries, such as the scowl and snarl of angry behavior, the upturned nose of disgust, the stare of attempted mastery, the averted glance at the sight of a fearful object, the cooing of motherly behavior and the lowered eyes of submission, have been set forth in connection with their several situations. But in the case of others, including some of the most notable, it is very hard to discover to what situations they are by original nature bound. We do not know just what situations originally provoke smiling, laughing, crying, weeping, blushing, frowning, and pouting, in spite of the fact that these responses have been made the subject of investigation by Darwin ['72] and by many able and industrious students following him.

Since these problems are of comparatively little moment to our general purpose, it will be best to spend the space that is available in illustrating the treatment of one of them rather than in a necessarily superficial and dogmatic rehearsal of the probable answers to them all. For this purpose I choose *Laughing*.

Darwin's description of the nature of this response is the most instructive for quotation. He says:

"The sound of laughter is produced by a deep inspiration followed by short, interrupted, spasmodic contractions of the chest, and especially of the diaphragm. Hence we hear of 'laughter holding both his sides.' From the shaking of the body, the head nods to and fro. The lower jaw often quivers up and down, as is likewise the case with some species of baboons, when they are much pleased.

During laughter the mouth is opened more or less widely, with the corners drawn much backwards, as well as a little upwards; and the upper lip is somewhat raised. The draw-

ing back of the corners is best seen in moderate laughter, and especially in a broad smile—the latter epithet showing how the mouth is widened, . . . Dr. Duchenne repeatedly insists that, under the emotion of joy, the mouth is acted on exclusively by the great zygomatic muscles, which serve to draw the corners backwards and upwards; but judging from the manner in which the upper teeth are always exposed during laughter and broad smiling, as well as from my own sensations, I cannot doubt that some of the muscles running to the upper lip are likewise brought into moderate action. . . .

By the drawing backwards and upwards of the corners of the mouth, through the contraction of the great zygomatic muscles, and by the raising of the upper lip, the cheeks are drawn upwards. Wrinkles are thus formed under the eyes, and, with old people, at their outer ends; and these are highly characteristic of laughter or smiling. As a gentle smile increases into a strong one, or into a laugh, every one may feel and see, if he will attend to his own sensations and look at himself in a mirror, that as the upper lip is drawn up and the lower orbiculars contract, the wrinkles in the lower eyelids and those beneath the eyes are much strengthened or increased. At the same time, as I have repeatedly observed, the eyebrows are slightly lowered, which shows that the upper as well as the lower orbiculars contract at least to some degree, though this passes unperceived, as far as our sensations are concerned. . . .

The tendency in the zygomatic muscles to contract under pleasurable emotions is shown by a curious fact, communicated to me by Dr. Browne, with respect to patients suffering from *general paralysis of the insane.* 'In this malady there is almost invariably optimism—delusions as to wealth, rank, grandeur—insane joyousness, benevolence, and profusion, while its very earliest physical symptom is trembling at the corners of the mouth and at the outer corners of the eyes. This is a well-recognized fact. Constant tremulous agitation of the inferior palpebral and great zygomatic muscles is pathognomic of the earlier stages of general paralysis. The countenance has a pleased and benevolent expression. As the disease advances other muscles become involved, but until complete fatuity is reached, the prevailing expression is that of feeble benevolence.'

As in laughing and broadly smiling the cheeks and upper lip are much raised, the nose appears to be shortened, and the skin on the bridge becomes finely wrinkled in transverse lines,

with other oblique longitudinal lines on the sides. The upper front teeth are commonly exposed. A well-marked naso-labial fold is formed, which runs from the wing of each nostril to the corner of the mouth; and this fold is often double in old persons.

A bright and sparkling eye is as characteristic of a pleased or amused state of mind as is the retraction of the corners of the mouth and upper lip with the wrinkles thus produced. Even the eyes of microcephalous idiots, who are so degraded that they never learn to speak, brighten slightly when they are pleased. Under extreme laughter the eyes are too much suffused with tears to sparkle; but the moisture squeezed out of the glands during moderate laughter or smiling may aid in giving them lustre; though this must be of altogether subordinate importance, as they become dull from grief, though they are then often moist. Their brightness seems to be chiefly due to their tenseness, owing to the contraction of the orbicular muscles and to the pressure of the raised cheeks. But, according to Dr. Piderit, who has discussed this point more fully than any other writer, the tenseness may be largely attributed to the eyeballs becoming filled with blood and other fluids, from the acceleration of the circulation, consequent on the excitement of pleasure. . . .

A graduated series can be followed from violent to moderate laughter, to a broad smile, to a gentle smile, and to the expression of mere cheerfulness. During excessive laughter the whole body is often thrown backward and shakes, or is almost convulsed; the respiration is much disturbed; the head and face become gorged with blood, with the veins distended; and the orbicular muscles are spasmodically contracted in order to protect the eyes. . . .

Excessive laughter, as before remarked, graduates into moderate laughter. In this latter case the muscles round the eyes are much less contracted, and there is little or no frowning. Between a gentle laugh and a broad smile there is hardly any difference, excepting that in smiling no reiterated sound is uttered, though a single rather strong expiration, or slight noise —a rudiment of a laugh—may often be heard at the commencement of a smile. On a moderate smiling countenance the contraction of the upper orbicular muscles can still just be traced by a slight lowering of the eyebrows. The contraction of the lower orbicular and palpebral muscles is much plainer, and is shown by the wrinkling of the lower eyelids and of the skin beneath them, together with a slight drawing up of the upper

lip. From the broadest smile we pass by the finest steps into the gentlest one. In this latter case the features are moved in a much less degree, and much more slowly, and the mouth is kept closed. The curvature of the naso-labial furrow is also slightly different in the two cases. We thus see that no abrupt line of demarcation can be drawn between the movement of the features during the most violent laughter and a very faint smile." ['72, pp. 200-208, *passim.*]

Hall and Allin ['97] emphasize the variations that may occur in the detailed nature, relative intensity and order of appearance of the brightening of the eyes, drawing up and back of the corners of the mouth, opening of the mouth, repeated brief contractions of the muscles of the chest and diaphragm and vocalization which are the essentials of natural laughter. Thus:—

"In our returns laughter began in 71 cases with the eyes, and in 51 cases with the mouth. The eyes are said to grow bright, glitter, sparkle (involving a tension of all the muscles of the bulbus), to twinkle (rapid lid movements), to dance (irregular or oscillatory movements of the recti), the mouth stretches, corners are drawn upward or sometimes downward, very often twitch or quiver. The mouth commonly opens, except in the simper, when it is nearly or quite closed. The lips are said to curl. In a few cases the laugh begins with dimples in the cheeks, and in others the muscles just below the ear move. In still other cases the first symptom is the throwing back of the head, and in others a snort or chuckle. Of the body movements about two-thirds assert that the shoulders, and one-third that the diaphragm, first move. . . ."

"The vocal expressions of laughter are extremely diverse. The sound most generally emitted is described as he, he, passing over to ha, ha. But almost every kind of noise occurs. F., 17. Is said to "bray somewhat like a donkey." F., 15. "Cackles." M., 28. Makes a loud guttural "yock." M., 10. Laughs "somewhat like a rooster." M., 21. "Snorts." F., 15. "Grunts like a pig." F., 20. Laughs without vocalization, but with a noise like the emission of steam. The laugh of Chinamen is described as a chattering sound. One laughs "deep down in his chest;" another "laughs up among his teeth;" another is said to have a laugh which is said to be like a "fog horn;" another "rumbles." F., 17. "Yells and

shrieks." F., 10. Laughs with a "simmering laugh." M., 16. With an "explosive staccato sound." Some make no noise at all, others sob or make a noise that seems like crying. Some are said to snarl, others make a very soft te-he, others a loud ho, ho, three are said to "neigh like a horse," some only gasp, some laugh in a very high, some in a low key, some make noises said to be indescribable or between a laugh and a cry. Every vowel and most consonants are used in our returns in efforts to describe noises. Some "laugh like parrots, crows, peacocks, sheep, goats;" some make a "scraping, rasping, throaty noise," and some a very musical tone; some go up and some go down the scale. Other laughs are described as "tse, tse; uckle-uckle; hep, hep; haw-haw, wah, wah; iff, iff; hickle, hickle; kee, kee; gah, gah." ['97, pp. 4-6, *passim.*]

The need of impartial observation and experiment to discover just what the original nature of man is finds brilliant illustration in the case of laughing. No one knows with surety what man would laugh at apart from training, although definitions and theories of the laughable have been devised by one after another gifted student of human nature, from Aristotle to Bergson.

Indeed, no one of these theories has succeeded in reporting what situations do provoke man to laughter either by nature or by training. Thus the sense of superiority theory—"that the passion of laughter is nothing else but sudden glory arising from sudden conception of some eminency in ourselves, by comparison with the inferiority of others or our own formerly" (Hobbes)—fails to cover the most important case of all—the fluent, semi-conscious laughter of healthy babies at play. Mr. J. L. Ford has restated the 'sense of superiority' theory in the more cautious and more matter-of-fact form that nine-tenths of the laughter of men is at real or acted or narrated disaster or misfortune, but the same objection holds.

The theory that incongruity between one's thought and the object or between one's expectation from the situation and its actual behavior is the element to which laughter is the response has been upheld in various forms by Kant, Schopen-

hauer, Spencer and others, the following being representative statements:

"In the case of jokes (the art of which, just like music, should rather be reckoned as pleasant than beautiful) the play begins with the thoughts which together occupy the body, so far as they admit of sensible expression; and as the Understanding stops suddenly short at this presentment, in which it does not find what it expected, we feel the effect of this slackening in the body by the oscillation of the organs, which promotes the restoration of equilibrium and has a favorable influence upon health.

In everything that is to excite a lively convulsive laugh there must be something absurd in which the Understanding, therefore, can find no satisfaction. *Laughter is an affection arising from the sudden transformation of a strained expectation into nothing.*" [Kant, *Kritik of Judgment,* Bernard's translation, § 54, p. 223.]

"Just that incongruity of perceptual and abstract knowledge . . . is also the basis of a very noteworthy phenomenon which . . . is absolutely peculiar to human nature and for which explanation after explanation has hitherto been attempted but always unsuccessfully. I refer to laughter. . . .

Laughter arises always from no other fact than the immediately appreciated incongruity between a notion and the real objects which were thought by means of it, whatever the relation be, and is itself nothing but the expression of this incongruity. . . . Every act of laughter arises therefore on the occasion of a paradoxical and so unexpected subsumption, regardless of whether this is expressed by words or acts. This is in brief the correct explanation of the laughable." [Schopenhauer, *Die Welt als Wille und Vorstellung,* p. 70 of vol. 2 of the Brockhaus ('77) edition of his collected works.]

Spencer notes that "laughter often occurs from extreme pleasure or from mere vivacity" and apparently allows that the sense of superiority (as by the humiliation of others) is a generalization of certain conditions to laughter. The incongruity theory he modifies to the form that "laughter (at the incongruous) naturally results only when consciousness is unawares transferred from great things to small—only where there is what we may call a *descending incongruity.*" [*Essays: Scien-*

tific, Political and Speculative (Second Series), American edition of 1864, p. 116.]

Darwin was perhaps wiser in assuming that laughter is a development from smiling and is fundamentally attached to the same situations as smiling is, and that these are substantially identical with satisfying states of affairs in general.

"Laughter seems primarily to be the expression of mere joy or happiness. We clearly see this in children at play, who are almost incessantly laughing. With young persons past childhood, when they are in high spirits, there is always much meaningless laughter. The laughter of the gods is described by Homer as "the exuberance of their celestial joy after their daily banquet." A man smiles—and smiling, as we shall see, graduates into laughter—at meeting an old friend in the street, as he does at any trifling pleasure, such as smelling a sweet perfume. Laura Bridgman, from her blindness and deafness, could not have acquired any expression through imitation, yet when a letter from a beloved friend was communicated to her by gesture-language, she "laughed and clapped her hands, and the colour mounted to her cheeks." On other occasions she has been seen to stamp for joy.

Idiots and imbecile persons likewise afford good evidence that laughter or smiling primarily expresses mere happiness or joy. Dr. Crichton Browne, to whom, as on so many other occasions, I am indebted for the results of his wide experience, informs me that with idiots laughter is the most prevalent and frequent of all the emotional expressions . . . The joyousness of most of these idiots cannot possibly be associated, as Dr. Browne remarks, with any distinct ideas: they simply feel pleasure, and express it by laughter or smiles. With imbeciles rather higher in the scale, personal vanity seems to be the commonest cause of laughter, and next to this, pleasure arising from the approbation of their conduct." ['72, p. 196 f.]

Darwin also appreciated the need of explaining the fact that tickling so commonly provokes laughter—a fact which is a thorn in the side of all the grandiose theories of the comic.

"The imagination is sometimes said to be tickled by a ludicrous idea; and this so-called tickling of the mind is curiously analogous with that of the body. Every one knows how immoderately children laugh, and how their whole bodies are

convulsed when they are tickled. The anthropoid apes, as we have seen, likewise utter a reiterated sound, corresponding with our laughter, when they are tickled, especially under the armpits . . . Yet laughter from a ludicrous idea, though involuntary, cannot be called a strictly reflex action. In this case, and in that of laughter from being tickled, the mind must be in a pleasurable condition; a young child, if tickled by a strange man, would scream from fear. The touch must be light, and an idea or event, to be ludicrous, must not be of grave import." ['72, p. 199.]

Bergson ['11*] declares that the situation which provokes laughter must be within the pale of human behavior or at least be temporarily so regarded. "You may laugh at an animal, but only because you have detected in it some human attitude or expression. You may laugh at a hat, but what you are making fun of, in this case, is not the piece of felt or straw, but the shape that men have given it—the human caprice whose mould it has assumed [p. 3]. In particular it is any feature of a man's behavior (or of the behavior of something which is for the time being assimilated to man) which has a certain unusual and inappropriate stiffness and lack of adjustment—"a certain *mechanical* inelasticity, just where one would expect to find the wideawake adaptability and the living pliableness of a human being" [p. 10]. Failure of adaptation, rigidity, "the deflection of life toward the mechanical," "something mechanical encrusted on the living," "the body taking precedence of the soul" are other expressions, the cleverest of all being the dictum that "we laugh every time a person gives us the impression of being a thing" [p. 58].

The felicity of M. Bergson's epigrams should not hide the inadequacy of his doctrine. It fits only the one case of laughing *at* a definite object, not the more fundamental laughter of delight, laughter by contagion when others laugh, laughter of sheer high spirits and merriment. It is guilty of substantially the same sins of omission as is the superiority doc-

*A revision and translation into English of essays which appeared in their first form in 1900.

trine, though it does not commit the latter's sin of assuming that every opportunity to feel superior is an adequate stimulus to laughter.

Hall and Allin think as a result of their census of experiences ['97] that being tickled, the behavior of familiar animals, recovery from slight fear, the calamity of another, the so-called practical joke, caricature, sudden slight shock and the forbidden or secret, are the chief objects to which laughter is an unlearned response.

Sully ['02, p. 57 ff.] defines the total situation in which tickling produces laughter as one in which "the child is happy and disposed to take things lightly and as play," in which the expected contact comes from a "good-natured mother or nurse by way of play," so that there is "relief from a serious and constrained, attitude, a transition from a momentary apprehension . . . to a joyous sense of harmless make-believe." He thinks that the sudden relaxation of a specially severe strain evokes laughter of the nervous semi-hysterical sort [*ibid.*, 65 ff.]. "The laughter of joy is most noticeable," he thinks, "under two sets of conditions. Of these the first is the situation of release from external restraint." The second is "the arrival of some good thing which is at once unexpected and big enough to lift us to a higher level of happiness" [*ibid.*, p. 72]. Under these two general rules Sully would bring the resumption of the play attitude, kindly teasing, practical joking, relief and exultation after victory, and relief from the 'emotional pressure' of solemn occasions. The 'more intellectual' causes of laughter he finds to be: 'novelty and oddity' to a person feeling himself secure; 'bodily deformities,' especially 'additions or extensions;' 'certain moral deformities' such as 'dumbness, cowardice, miserliness, and vanity;' 'breaches of order and rule;' 'small misfortunes, especially those which involve something in the nature of a difficulty or "fix"'; 'the indecent;' 'pretences;' the exhibition of 'want of knowledge or of skill;' 'relations of contrariety and incongruity;' 'verbal play and amusing witticism;' 'objects which affect us as expressions of a merry mood;'

and 'situations which involve a relation akin to that of victor and vanquished.' [*ibid.*, pp. 82-153, *passim.*]

The reader will have noted that the simple general theories of the situations to which laughter is the response fail to fit the facts, whereas the attempts of Hall and Allin and of Sully to work up from the facts leave us with an unorganized mélange of provocatives of laughter. What originally provokes laughter must be, one feels, some simpler set of situations or elements of situations than they list, but these original bonds, which grow into the complex of habits of laughing in response to health, slight shock, caricature, others' discomfort, being tickled and so on, remain uncertain.

Similar disagreements and complexities would be found also in the case of man's original tendencies to weep, blush, increase heart-rate or deepen inspiration. The discovery and proof of what situations originally provoke these expressive movements, obvious or hidden, is a task for the future.

CHAPTER XII

Consciousness, Learning, and Remembering

Our inventory so far has not included the original tendencies of the original tendencies themselves—the original tendencies not *to* this or that particular sensitivity, bond or power of response, but *of* sensitivities, connections and responses, in general. Thus, it is a fact of original nature that being impressed by this, that and the other situation and making this, that and the other connection occupies time, may produce the inner life which a man has as his consciousness, and may leave an effect upon the man's nature long after the situation and response of that time are ended. It is a fact of original nature that certain states of affairs are satisfying to a man's neurones—are such as they do nothing to avoid, whereas other states of affairs are annoying to the neurones—stimulate them to do something until the annoying state of affairs gives way to a satisfying one which they do nothing to avoid. That is, reflexes, instincts and capacities (1) always take place in time, (2) sometimes produce or modify the inner conscious life of the animal whose they are, and (3) sometimes change the organism more or less permanently. The neurones which are concerned in them have roughly the original tendency (4) to do nothing different when their life processes are being facilitated and to make whatever changes are in their repertory when their life processes are disturbed.

The first of these general tendencies everyone properly takes for granted. No more need be said of it.

ORIGINAL TENDENCIES TO CONSCIOUSNESS

Little need be said of the second. Man's original nature is such that, when certain parts of his millions of neurones act

in certain ways, he has, or is, certain states of awareness, feeling, consciousness, purely mental existence, or whatever one chooses to call the inner life to which a man refers when he asks himself, 'Is this the same dream that I had last night?' or, 'Is this pain different from what I felt a second ago?' What, in detail, the exact nature of the consciousness related to any given action of any given part of his neurones is, no one knows. But no competent thinker doubts that bonds exist in original nature whereby any one given status of a man's nervous system produces always the same condition of consciousness. Whenever, from any set of causes, that neurone-status is brought to pass, that condition of consciousness will also appear.

It is conceivable that, if provided with enough knowledge and skill, man might determine his states of consciousness by direct operations upon his neurones. By local stimulation and restriction of the action of neurones he might induce one emotion or thought and abolish another, as he now increases the sense of well-being by alcohol or dulls pain by morphine. He might then use the original tendencies for certain action in certain neurones to produce a certain condition of consciousness in as practical a way as we now use the original tendency for a touch on the back of the tongue to produce swallowing movements.

THE CAPACITY TO LEARN

The third fact noted above refers to the capacity for permanent modifiability or 'learning,' which is, from the point of view of man's welfare, the most important fact in nature.

The Law of Use.—To the situation, 'a modifiable connection being made by him between a situation S and a response R,' man responds originally, other things being equal, by an increase in the strength of that connection. By the strength of a connection is meant the probability that it will be made when the situation recurs. Greater probability that a connection will be made means a greater probability for the same time, or an

equal probability but for a longer time.* Thus, strengthening the connection between 'being asked how many six and seven are' and 'saying "thirteen," ' may mean that the probability of that response during the next six days is eight out of ten instead of seven out of ten, or that the probability is seven out of ten for sixty days instead of for forty.

The Law of Disuse.—To the situation, 'a modifiable connection not being made by him between a situation S and a response R, during a length of time T,' man responds originally, other things being equal, by a decrease in the strength of that connection.

The tendencies of use and disuse may be listed together under one name as the *Law of Exercise.*

As corollaries of the law of use we have the facts that the degree of strengthening of a connection will depend upon the vigor and duration as well as the frequency of its making. To think '6+7=13' attentively and for ten seconds will thus increase the strength of its bond more than to think of it lightly and for only half a second.

The Law of Effect.—To the situation, 'a modifiable connection being made by him between an S and an R and being accompanied or followed by a satisfying state of affairs' man responds, other things being equal, by an increase in the strength of that connection. To a connection similar, save that an *annoying* state of affairs goes with or follows it, man responds, other things being equal, by a decrease in the strength of the connection.

As a corollary to the law of effect we have the fact that the strengthening effect of satisfyingness varies with its intimacy with the bond in question as well as with the degree of satisfyingness. Such intimacy, or closeness of connection between the satisfying state of affairs and the bond it affects, may be due to close temporal sequence or to attentiveness to the situation and response. Other things being equal, the

*Certain additions and qualifications are necessary to make this definition adequate, but it will serve provisionally.

same degree of satisfyingness will act more strongly on a bond made two seconds previously than on one made two minutes previously,—more strongly on a bond between a situation and a response attended to closely than on a bond equally remote in time in an unnoticed series.

These tendencies for connections to grow strong by exercise and satisfying consequences and to grow weak by disuse and annoying consequences should, if importance were the measure of the space to be allotted to topics, preëmpt at least half of this inventory. As the features of man's original equipment whereby all the rest of that equipment is modified for use in a complex civilized world, they are of universal importance in education. They are the effective original forces in what has variously been called nurture, training, learning by experience, or intelligence.

Since, however, they are so clear and straightforward, they need no comment at this point* save this reminder of their importance, a statement of which connections are modifiable, and a defense of them against certain wrong accounts of the original tendencies to strengthen and weaken bonds in behavior.

LIMITATIONS TO MODIFIABILITY

Which connections are modifiable is not known with absolute surety and precision. At one extreme are connections, such as that between 'being supported by only the air' and 'falling toward the centre of the earth,' which are utterly unmodifiable. At the other extreme are connections, such as that between the situation just mentioned and 'screaming,' which are obviously modifiable. One will always tend to fall but he may learn not to tend to scream.

The doubtful cases are the connections found in reflexes

*Since these original tendencies for use and satisfying consequences to strengthen connections, and for disuse and annoyingness to weaken them, are the efficient forces in learning, they will be discussed again in the second volume of this treatise from the point of view of an inquiry into man's acquired tendencies or the results of learning.

like the contraction of the pupil to brighter light, or sneezing at certain irritations of the mucous membrane of the nose, and in the still more purely physiological behavior of circulation, digestion, metabolism and the like.* It is chiefly in hygiene and medicine that doubt arises whether a certain change can or cannot be regulated by use, disuse, satisfyingness and discomfort.

THE SUPPOSED FORMATION OF CONNECTIONS BY 'FACULTIES'

There are three current opinions concerning the original capacities of man to learn, that is, to strengthen and weaken bonds in behavior, which seem contrary to fact. First is the opinion that attention, memory, reasoning, choice and the like are mystical powers given to man as his birthright which weight the dice in favor of thinking or doing one thing rather than another, however the laws of instinct, exercise and effect make the throw. This opinion is vanishing from the world of expert thought and no more need be said about it than that it is false and would be useless to human welfare if true.

THE SUPPOSED FORMATION OF CONNECTIONS BY THE PERCEPTION OF THEIR ACTION IN ANOTHER

The second opinion is that for a man to perceive an S-R sequence in another man's behavior in and of itself predisposes him to respond to that S by that R—that imitation exists as a force whereby the perception of R, in connection with S, in another man's behavior creates a bond between R and S in the perceiving individual. Of this I can find no evidence.

It is, of course, the case that imitation of a certain sort is potent in man's learning. First, certain behavior of other men, as has been shown, stirs the percipient to the same behavior. Smiling at a smile, following a leader, and being

*"Occasional instances are recorded of power to slow the rhythm of the heart at will; others of power to suppress the reflex of swallowing when it has entered on its pharyngeal stage." [Sherrington, '06, p. 389.]

pleased at another's pleasure are, like most instincts, educative in their limited sphere. In the second place, the behavior of other men again and again provides models which decide, in whole or in part, the satisfyingness of one's own responses, and so are accessories in the action of the law of effect. But this is not the imitation required by the opinion in question. The enunciation or gesture of another man, acting as a model, forms one's habits of speech or manners in just the same way that the physical properties of trees form one's habits of climbing.

In the third place, the behavior of other men may, as a child's intellect develops, suggest to him all sorts of ideas; these ideas may lead to acts by the laws of exercise and effect; these acts may often be like those which gave the suggestion. Thus seeing someone taking a drink of water may suggest awareness of my own thirst, or the fact that I shall not again have an opportunity to get water during the afternoon, or the mere thought of getting a drink. Any one of these thoughts has strong connections by previous habit with the response of getting a drink. The behavior of others is a very important provider of situations to which habit has bound responses like the behavior seen. But the binding force is habit —that is, the laws of exercise and effect—not imitation in the sense required by the theory in question.

For the sheer direct potency of an S-R connection witnessed to reproduce itself in the witness, the evidence alleged is that from infant life rehearsed on pages 110-122 (which, we found, shrank to the pitiable mystery of one or two babies sticking out their tongues) and that from men in mobs who are supposed to display this sheer direct modifiability by imitation because they act *against* habit and their own essential desires. It is beyond the scope of this book to explain mob-psychology, but a recital of the details in such cases would, I think, show that fleeing, attacking, pouncing on and rending, and other wholes or fragments of instinctive coöperative activities, were all that happened supposedly as a consequence of

imitation. Such would happen by reason of specific original bonds with the specific situations, irrespective of any general imitative tendency, if acquired restraints were dissipated by excitement, temporary monomania or the suggestions of a magnetic leader.

There is then no more evidence for thoroughgoing imitation as a general capacity for learning than we found for it as a general instinctive response to the behavior of other men. The two senses would indeed be the same, and the facts noted here and in Chapter VIII could as well have been combined in one contra-argument.

THE SUPPOSED FORMATION OF CONNECTIONS BY THE POWER OF AN IDEA TO PRODUCE THE ACT WHICH IT REPRESENTS

Next, and even more orthodox, is the theory of ideo-motor action, that the idea of an act or of the result of an act, or of some part of such result, tends, in and of itself, to produce or connect with that act. Accordingly an act may be bound to any situation by connecting with that situation some conscious representation of that act.

The classic statement of the power to bind acts to situations by so linking ideas of them is given by James in the often quoted dictum:—

"We may then lay it down for certain that *every representation of a movement awakens in some degree the actual movement which is its object; and awakens it in a maximum degree whenever it is not kept from so doing by an antagonistic representation present simultaneously to the mind.*" ['93, vol. 2, p. 526.]

McDougall, in listing ideo-motor action as a 'general or non-specific innate tendency,' describes it thus:

"In the special case in which the object to which we direct our attention by a volitional effort is a bodily movement, the movement follows immediately upon the idea in virtue of that mysterious connection between them of which we know almost nothing beyond the fact that it obtains" ['08, p. 242]; and

elsewhere " . . . the visual presentation of the movement of another is apt to evoke the representation of a similar movement of one's own body, which, like all motor representations, tends to realize itself immediately in movement" ['08, p. 105].

Wundt's account of the power of an image or idea of a movement to connect that movement with itself is obscure, but he seems to state that kinesthetic images tend as situations to evoke responses which they have not evoked before but which they are like. The apperception of an image of a movement, he says, is followed by the movement unless some contrary force acts. In particular "children and primitive men are not able to get fully a vivid idea of a movement of their own bodies without having such a movement actually take place" ['93, vol. 2, p. 567 f.]. The context shows that Wundt does not at all mean that they need to make the movement so as to get the image, but accepts the common view that any image tends to evoke the movement which it most resembles or is an image of, regardless of whether any bond has been made by use, disuse, satisfaction or discomfort.

Against this orthodox opinion, I contend that the idea of a movement (or of any response whatever) is, in and of itself, unable to produce it. I contend that an idea does not tend to provoke the act which it *is an idea of,* but only that which it *connects with as a result of the laws of instinct, exercise and effect.*

In particular I contend that any idea, image, sensation, percept, or any other mental state whatever, has, apart from use, disuse, satisfaction and discomfort, no stronger tendency to call up a movement like itself or meant by it than to call up any other movement. Two intelligible meanings can be attached to 'the representation of a certain movement by an idea,' or to 'an idea having a certain movement as its object,' or to 'an idea being of a certain movement,' and the like. The first is that the idea is like the movement in the same way that the mental image of a red inch square *is like* such a square. The second is that the idea *means* the movement in the same

way that the image of the words 'red inch square' means such a square. I hold that in neither meaning does an idea tend to produce what it represents or has as its object, or is an idea of —that, in and of itself, an idea tends to do so no more when what it represents is a movement of one's own body than when what it represents is a red-inch-square.

The upholders of the orthodox view have not stated what 'the mysterious connection' is. They may mean by 'represent,' 'have as object' and 'be of' simply 'tend to produce,' 'lead to,' 'evoke as response.' In that case the doctrine of the 'impulsive power of ideas' is a mere tautology, stating that an idea produces what it does produce, evokes as a response what it does evoke. Just this may indeed have been James' meaning. For he was interested primarily in the negative fact that no special *ad hoc* consciousness of 'willing' was a necessity. It was indifferent to his main purpose *how* an idea was able to lead to action.*

They may mean by 'to represent' or 'to have as object' simply 'to have been connected with in accordance with the laws of exercise and effect.' In that case, the doctrine of the 'impulsive power of ideas' is precisely, as I assert, one small fea-

*The reader acquainted with psychological literature on Action will understand that I have quoted James' account of the doctrine that the resemblance between an idea and an act (or the act's result) tends in and of itself to form a bond between that idea and that act simply because his statement is one of the clearest, most instructive, and most accepted by psychologists, not because he is prominent as a defender of such magic powers in general. On the contrary, James advocated idea-motor action as a refuge from a still worse magic, the supposed need of some innervation-sense, or some special consciousness of willing, or some *ex cathedra fiat* of one's personality, in order to get out of bed or wash one's face. He was not interested in showing positively that connections can be created between a situation and an act by the likeness of the former to the latter, but in showing negatively that man does not need a special volitional act or conscious *fiat* or fore-feeling of the muscle's innervation to create them. For his purpose it made no difference whether for an idea to be 'a representation of a movement' meant 'to be like it' or 'to have been a situation provoking it,'—whether for a movement to be the 'object' of an idea meant to be like it or to have been provoked by it. He did not raise the issue.

ture of the general law that any situation tends to produce the response that original nature and these laws of learning have bound to it. So Angell states, in discussing this matter, that "the appropriate muscular activity never follows an idea unless one's previous experience has in some fashion or other established a nexus of the habit type." ['04, p. 356 f.]

In general, however, as the use of the doctrine of ideo-motor action in applications to education, medicine and ethics shows, its adherents do assume an intrinsic tendency of an idea to produce the movement which it is like, or which it means, or both. This appears in a recent statement of the doctrine made, with awareness of the contrary view, by Washburn. She says: "A movement idea is the revival, through central excitation, of the sensations, visual, tactile, kinesthetic originally produced by the performance of the movement itself. And when such an idea is attended to, when, in popular language, we think hard enough of how the movement would "feel" and look if it were performed, then, so close is the connection between sensory and motor processes, the movement is instituted afresh. This is the familiar doctrine expounded by James in Chapter XXVI of his "Psychology." ['08, p. 280.]

It is asserted here that, if, to a certain situation, S_1, a certain movement, M_1, is the response and if M_1 in turn produces the sensations 'visual, tactile, kinesthetic,' Sen_1, then Sen_1, or the images corresponding to Sen_1 (call these Im_1), will have power, irrespective of any additional connections in the animal's experience, to evoke some movement. It is asserted further that Im_1 will evoke the particular movement M_1 which produced Sen_1. Washburn does not say whether this potency is due to the likeness of Im_1 to M_1, or to the fact that Sen_1 followed M_1 closely in the same pulse of life. I am willing to admit a slight bond due to the latter cause, though I should insist that S_1 would be much more closely bound as antecedent to M_1 than Sen_1 or Im_1 would be, by such an experience.

Since Miss Washburn goes on to make such $Im_x \rightarrow M_x$ ten-

dencies the essential thing in the acquisition of skill, and since the very slight *forward* bond created by use between a condition and the condition *preceding* it is obviously not the essential thing in such learning, it seems certain that she has in mind some veritable potency of likeness. The close 'connection between sensory and motor processes' which she posits would seem to be the connection between a given sensory process Sen_1 and the movement, M_1, which it *was like,* and would seem to be close, not because the $M_1 \rightarrow Sen_1$ connection had, as an additional effect, a very slight tendency to production of the $Sen_1 \rightarrow M_1$ connection, but because Sen_1 was more 'like' M_1 than any other M.

Professor Calkins still more explicitly states that in voluntary action we arouse a certain response by getting in mind an idea that is *like* the response. An 'outer' volition being a volition to act in a certain way and an 'inner' volition being a volition to think in a certain way, "The volition is the image of an action or of a result of action which is normally *similar* and antecedent to this same action or result. My volition to sign a letter is either an image of my hand moving the pen or an image of my signature written, and my volition to purchase something is an image of myself in the act of handing out money or an image of my completed purchase—golf stick or Barbedienne bronze." ['01, p. 299.] Inner volitions "do not so closely resemble their results. The volitional image of an act may be, in detail, like the act as performed;" but the volitional image of a thought is followed by only a "partially similar" thought. ['01, p. 303.]

Whatever be the precise opinions of these particular authors, there is a general belief that the likeness of an act to an idea creates an efficient bond between them. Since this belief, or something to the same effect, is at the bottom of widespread practices in medicine, moral education, school management, business and politics, it and the denial of it which I have made, must be examined.

First of all, if James' 'representation of a movement' and

McDougall's 'idea' are taken in their ordinary meanings, cases can be found where such cannot awaken the actual movements which they are representations of ideas of. A little child may have made a certain movement* a thousand times and may be entirely willing and eager to make it, but, no matter how vividly the movement is described to him, he cannot make it as a result of the ideas of it evoked by such a description and his own best efforts if, hitherto, he has made the movement only in response to sensory stimuli. The idea has to be connected with the movement or with the sensory stimuli to which the movement is the response by exercise or effect before it has an iota of efficiency in awakening the movement.

An idea of an act, not bound to that idea by use and effect certainly *need* not be immediately followed by that act. If all the readers of this page summon the most lively and accurate ideas that they can of sneezing, vomiting and hiccuping, one after another, not once in a hundred times will the actual movements be made. Either the reader cannot get a representation of those movements of the sort the theory has in mind, or the theory fails. But if the representation of the movement needed by the theory is such as not one in a hundred well-intentioned students of psychology can get, the theory becomes *a priori* very dubious. Why should men in general have the capacity to provoke an act by an idea of it, but only such an idea as not one man in a hundred can summon?

In the second place, in at least the majority of connections where the idea of an act does produce the actual movement; the connection can be proved to have been built up by the laws of exercise and effect. When one has the idea of going to bed and goes, or of writing the word 'cat' and writes it, the explanation is found in the previous training that has put the idea of going to bed with being sleepy and other situations to which going to bed was the original or acquired response, or has put the act of going to bed with the idea of doing so.

*The cases observed are those of emptying the bladder, and of defecation.

Let the reader now, as he sits in his chair, summon unopposed the idea of standing up. He may do it, for the idea of standing up has gone with many direct sensory situations which have, by exercise and effect, led to rising from a chair. It has, indeed, itself been bound as situation to that response. But let him summon the idea of diving off a post and he will not make the corresponding movements,* but, if he does anything, will stand up. Then of course he may make the diving movements. What 'follows immediately upon the idea' of a movement is the act that *has followed* it or some element of it often or with resulting satisfaction, not the act that *is like* the idea.

In the third place, it is certain that, apart from exercise and effect, such ideas of movements as one commonly gets do not as a rule produce the movements, and that such movements as one makes do not often come from ideas of them. Let the reader think of the following movements one after another:—reaching for an apple on his knee, grasping it, putting it in his mouth, biting it, chewing the pieces, swallowing the chewings; getting out of bed, walking to his bath, turning the faucet, climbing into the tub, splashing himself, getting out, shivering, taking towels from the rack, rubbing himself; taking a book, opening at page 1, moving the eyes as in reading; and so on through a thousand movements of daily life. Consider also the thousand or more different voluntary movements last made by you. How few were responses to ideas of them and how many were responses to sensory situations or ideas totally different from them but with which they had been connected by habit! In the illustrations given by James in the very section in which he announces the doctrine of ideo-motor action, all but one show the movement led up to by a sensorial situation or an idea that is not of the movement at all. That one shows the person *making the movement in order to get the idea of it!*

Since these illustrations are typical of the evidence that has

*That is, such portions of them as could be made from a sitting position.

been used to support the doctrine that 'we think the act and it is done,' they may profitably be examined one by one. The first two are as follows: "Whilst talking I become conscious of a pin on the floor, or of some dust on my sleeve. Without interrupting the conversation, I brush away the dust or pick up the pin. . . . the mere perception of the object and the fleeting notion of the act seem of themselves to bring the latter about" ['93, vol. 2, p. 522]. Now what would be the probable response to the 'mere perception' of the dust on the sleeve supposing there had been no 'notion of the act'? Surely to brush it away. And with what would 'the notion of the act' have been bound by the laws of exercise and effect alone? Surely with the response of brushing the dust away. So also with picking up the pin. By the laws of exercise and effect the sensorial situation without the idea is adequate to produce the response; and the idea itself needs no potency from its likeness to the act.

"Similarly I sit at table after dinner and find myself from time to time taking nuts and raisins out of the dish and eating them . . . the perception of the fruit and the fleeting notion that I may eat it seem fatally to bring the act about." [*ibid.*, p. 522 f.] It seems clear that for the behavior in question no other force than the perception of the fruit and the laws of exercise and effect is needed. The notion 'that I may eat it' is here not only one to which the act might well be bound by exercise and effect, but is apparently nowise like the acts to which it leads. The notion seems to be a rather vague one, 'all right to eat it' occurring once, while the act is a very complex one of reaching, grasping, carrying to the mouth, etc., and is repeated over and over again.

The fourth illustration is getting out of bed:—. . . "the idea flashes across me, 'Hollo! I must lie here no longer'—an idea which at that lucky instant awakens no contradicting or paralyzing suggestions, and consequently produces immediately its appropriate motor effects." [*ibid.*, p. 524.] Here the idea is patently not a representation of the movement at all. The

'Hollo' and 'I must' show clearly that it is in words,* not in images of leg, trunk and arm movements. Its motor effects are appropriate, not in the sense of being in the least *like* it or *represented by* it, but in the sense of being the effects which that idea, when uncontested, had, by exercise and effect, come to produce in that man. The 'Hollo! I must' is a lineal descendant of the sensory admonitions from others received during life and connected each with its sequent response by use, satisfaction, and the discomforting punishment attached to opposite courses.

These four cases are all such as a believer in the entire sufficiency of the laws of exercise and effect might properly choose as illustrations of their action. Moreover, in three the sensorial situation is adequate, and in the fourth the idea nowise represents or is like the movements.

The fifth case is: "Try to feel as if you were crooking your finger, whilst keeping it straight. In a minute it will fairly tingle with the imaginary change of position; yet it will not sensibly move because *its not really moving* is also a part of what you have in mind. Drop *this* idea, think of the movement purely and simply, with all brakes off; and, presto! it takes place with no effort at all." [*ibid.*, p. 527.] Now the essential fact here is that when one is told to try to feel as if he were crooking his finger, he tends, in the case of many subjects, to respond by taking an obvious way to get that feeling—namely, by actually crooking his finger. He responds to the request, regardless of any ideas beyond his understanding of the words, by a strong readiness to crook his finger. Being forbidden, he restrains the impulse. The 'tingling' is not from the *imaginary change* of the finger's position but from the *real restraint from changing* its position. The tingling occurs with individuals who cannot imagine the finger's movement. Far from showing that the imagined movement is adequate,

*If by any sophistry it could be twisted into a representation of leg and trunk movements, it would be only the representation of lying still plus the idea of negation.

in and of itself, to cause the movement, such cases show that it is unsafe to infer that the image comes first in cases where deliberately evoked images of movements are accompanied by the movements or parts thereof.

It appears then that the great majority of movements are not produced by ideas of them and that the majority of ideas of movements do not produce the movements which they represent. When an idea does produce the movement which it is an idea of, that movement gives evidence of having been bound to that idea by exercise or effect.* The connection whereby the idea of a movement could, in and of itself, produce that movement would indeed be mysterious if it existed, but it does not exist.

ATTEMPTED EXPLANATIONS OF LEARNING BY THE LAWS OF EXERCISE ALONE

A fourth error in the description of the original tendencies to alter the connections between situations and responses is to neglect the law of effect, the influence of satisfiers and annoyers in strengthening and weakening connections—to reduce the process of habit-formation to the effects of use and disuse alone. This inadequate view may be taken either from mere neglect of the observable facts in the case, or from a deliberate effort to get from evidence an even simpler view of the capacity to learn than that which I have defended. Of the latter origin are the hypotheses of Jennings, Stevenson Smith, and Hobhouse. A refutation of their arguments will therefore be the best way to establish the existence of an original tendency for satisfaction to strengthen, and discomfort to weaken, the bonds which they accompany or closely follow.

Jennings has formulated as an adequate account of learning the law that: "When a certain physiological state has been re-

*Further evidence against the assumption that ideas have power in and of themselves to create bonds in behavior may be found in an article by the author which will appear in the Psychological Review during 1913.

solved, through the continued action of an external agent, or otherwise, into a second physiological state, this resolution becomes easier, so that in course of time it takes place quickly and spontaneously." ['06, p. 289.] "The law may be expressed briefly as follows: The resolution of one physiological state into another becomes easier and more rapid after it has taken place a number of times. Hence the behavior primarily characteristic for the second state comes to follow immediately upon the first state. The operations of this law are, of course, seen on a vast scale in higher organisms in the phenomena which we commonly call memory, association, habit formation and learning." [*ibid.*, p. 291.] This law may be expressed symbolically as follows:

Let A, B, C and D represent a series of consecutive states of affairs in an animal. Let the bonds connecting them be represented by arrows. Let *b* and *c* represent B and C, when passed through rapidly and in modified form so that they lack any of the consequences of B and C save that of eventually leading to D.

Then the law is that

$$A \rightarrow B \rightarrow C \rightarrow D$$

tends, by mere repetition, to become

$$A \rightarrow D$$

or

$$A \rightarrow b \rightarrow c \rightarrow D.$$

Mere repetition, however, gives no reason for the production by A of now B, and later a different thing, D or *b*. If A is the same, it must in the same conditions produce always the same result. If it appears on repetition to produce a different result, there must have been some change in it or in the conditions. Mere repetition of $A \rightarrow B \rightarrow C \rightarrow D$ could never strengthen the $A \rightarrow D$ and weaken the $A \rightarrow B$ or $A \rightarrow C$ probabilities. If D is made more probable, and B and C less probable in connection with A, the oftener A occurs, it is because of the results of B, C and D to the organism in that connection.

Moreover "the resolution of one physiological state into

another" *via* connecting links does not, by repeated experiences of the series alone, "become easier so that in course of time it takes place quickly and spontaneously." Paramecium, as Jennings has so effectively shown, reacts again and again throughout its life by stopping, backing, turning to the aboral side and then swimming forward. Let A, B, C, and D be the states in the animal productive of these respective responses. By the law of resolution a Paramecium should after some scores or hundreds of such reactions experience A→D, and so stop and at once swim forward. Professor Jennings does not write *Paum* from having written *Paramecium* so often nor have to restrain himself from saying *y z* as soon as he has said *a b*.

The law of resolution was suggested to fit certain special cases where the situation which starts the behavior-series in question is itself annoying and where this annoying situation can be evaded only by a 'successful' response. We have, that is,

S producing AS a state of affairs in which S continues, and produces

BS, a different state of affairs, but one in which S still continues and, produces

CS, a different state of affairs, but one in which S still continues and, produces

D, which does not include S, and by excluding it, relieves the annoyance.

Now, by the law of effect, since D, the end-term of the series, is the only one that relieves the annoyance, the connection of S with D must be strengthened at the expense of all the other connections. So a series S→AS→BS→CS→D, will 'resolve' into its first and last term. It is the law of effect, however, that accounts for the resolution.

Stevenson Smith starts from this same special case of relief from an annoying situation by changing it for any other, arguing as follows:

"Let an organism at birth be capable of giving N reactions (a, b, c, . . . N) to a definite stimulus S and let only one of

these reactions be appropriate. If only one reaction can be given at a time and if the one given is determined by the state of the organism at the time S is received, there is one chance in N that it is the appropriate reaction. When the appropriate reaction is finally given, the other reactions are not called into play, S may cease to act, but until the appropriate reaction is given let the organism be such that it runs through the gamut of the others until the appropriate reaction is brought about. As there are N possible reactions, the chances are that the appropriate reaction will be given before all N are performed. At the next appearance of the stimulus, which we may call S_2, those reactions which were in the last case performed, are, through habit, more likely to be again brought about than those which were not performed. Let u stand for the unperformed reactions. Then we have N—u probable reactions to S_2. Habit rendering the previously most performed reactions the most probable throughout we should expect to find the appropriate reaction in response to

S_1 contained in N.
S_2 contained in N—u_1.
S_3 contained in N—u_1—u_2.
. . . . . .
S_n contained in N—nu, which approaches *one* as a limit.

Thus the appropriate reaction would be fixed through the laws of chance and habit. This law of habit is that when any action is performed a number of times under certain conditions, it becomes under those conditions more and more easily performed." ['08, pp. 503-504].

This attractively simple hypothesis is entirely inadequate to account for habit-formation in general, and can account for even the one special case only by supposing—what does not occur—that the animal *cannot repeat freely* any one of the performances in his repertoire of responses to S. Thus suppose that N=3, and call these a, b, and c. Let b be the 'appropriate' response that puts an end to S. Suppose the animal to repeat each response six times before changing to another. Then the following are all the possible results from

S, and each of these series is by chance equally likely to happen.

a a a a a b

a a a a a a c c c c c c b

b

b

c c c c c c b

c c c c c c a a a a a a b

In the long run, then, b can happen only one-third as often as a or c; and, though always successful, b must, if Smith's theory were true, appear steadily later and later. After enough repetitions of S, b could appear only after an infinite length of time!

Smith's hypothesis supposes the animal to be limited to such series as a b; a c b; b; b; c a b; c b. But animals do, as Smith's own admirable experiments abundantly show, very often repeat an 'unfavorable' response many times before changing to another. If the law of exercise acted alone, learning could therefore not be adaptive. It is the *effect* of b that binds it to S. It is the effect of a and c which, in spite of greater frequency of their occurrence, can weaken their connections with S. Indeed an animal may by original nature respond to S by

a a a c a a c c a b,

a a c c c c a a a c c b,

a c a c a a c c a c b, and the like, and yet eventually come to respond to S by b alone and at once, if a and c produce annoying states of affairs while b produces freedom from the annoyance or a positive satisfaction.

A less important attempt to explain the facts of modifiability or learning without the action of the law of effect is that of Hobhouse, who offers the incongruity with R_1 of the later response (R_2) to which any given response (R_1) to a situation (S_1) leads, as the force which disjoins R_1 from S_1. The congruity of R_2 with R_1 is the joining force. I quote Holmes' statement of Hobhouse's doctrine, since it is perhaps

clearer and better supported than the original statement. He writes:

"A new point of view in regard to our problem has been presented by Hobhouse in his *Mind in Evolution*. To illustrate this view let us recur to our chick. When a nasty caterpillar is seen for the first time the visual stimulus sets up a pecking reaction. This is followed by the stimulus of a bad taste which sets up various rejection movements, such as ejection of the food and wiping the bill. The order of events is: Stimulus . . . pecking . . . bad taste . . . rejection. When the same kind of caterpillar is met with a second time the stimulus tends to elicit the rejection movements with which it has been associated instead of the movements of pecking. Is not the inhibition due to the fact that the stimulus has become associated with a response which is incongruous with the first? Movements of rejection and avoidance are incompatible with those of pecking and swallowing and it may therefore be unnecessary to look to any peculiarity of the physiological correlates of pain for an explanation of the inhibition of the original reaction. The stimulus becomes coupled with a new reflex arc; nervous energy is drained off in a new channel, and the future behavior becomes changed. If the taste is a very bad one, a great deal of energy is involved and the connection with the rejection response made very permeable and the rejection movement easily set up. If a person is confronted with a sight of some nauseating medicine he has recently taken, avoiding or rejection movements are set up, such as making a face, or even retching movements of the stomach. Is it not these movements or attempts at movements that really inhibit the taking of the medicine? This is evinced by the chick described by Lloyd Morgan, which after an experience with a nasty caterpillar approached one a second time, but stopped and wiped its bill and went away as if it actually repeated its first experience. Of course inhibition of the original response does not always involve contrary movements, but there may be impulses to such movements which do not issue in action. The principal feature in the modification of action through painful experience is the assimilation of impulses incongruous with the original one.

In the reinforcement or stamping in of a reaction to a particular stimulus that brings pleasure, it certainly seems as if pleasure or its physiological correlate in some way serves to

cement more firmly the association between the stimulus and the response. Let us consider, however, the case in which the chick pecks at a caterpillar which has a good taste. The presence of the caterpillar in the mouth excites the swallowing reflexes; in the presence of a similar caterpillar the pecking response is made more readily than before, and whatever hesitation there may have been at first disappears. Is not the difference from the pain-response due to the fact that there is an organic incompatibility between the first and second responses in the pain response, while there is an organic congruity or mutual reinforcement of these responses in the other? Pecking and swallowing form the normal elements of a chain reflex; when one part of the system is excited it tends to excite the rest, to increase the general tonus of all parts concerned in the reaction.

According to the view here presented, whether a particular response to a stimulus tends to be repeated more readily or discontinued, depends not upon the peculiar physiological state which may be produced in the brain, but upon the kind of responses which the stimuli brought by the act call forth. If an outreaching reaction becomes coupled with a withdrawing response the result is inhibition. If the reaction, on the other hand, brings stimuli which produce congruent reactions the association formed with these latter reinforces the first reaction. The pleasure-pain response then resolves itself into the formation of associations. Withdrawing and defensive responses are usually initiated by pain-giving stimuli, and the instinctive or random movement which brings a painful stimulus is inhibited under similar conditions in the future, not because of the pain of its physiological correlate, but because it comes to be associated with a withdrawing or defensive, and hence an incongruous or inhibitory reaction. Pleasure and pain thus interpreted have no mysterious power of stamping in or stamping out certain associations. Whether the result is reinforcement or inhibition depends on the way in which a reaction and the secondary responses resulting from the situation in which the organism is thereby brought, happen to harmonize.

The step from instinct to intelligence viewed as a physiological process involves, therefore, no essentially new element beyond the well-known physiological properties of the nervous system, and we are not committed to any particular hypothesis as to the physiological accompaniments of pleasure or pain, or pleasantness and unpleasantness, in order to understand how behavior may become adaptively modified. How far the inter-

pretation given will enable us to explain the development of intelligence I do not pretend to say. It may break down in attempts to apply it to higher forms of learning, but it affords a useful working hypothesis and takes us a way, I think, toward the solution of our problem." ['11, p. 176 ff.]

This doctrine is easily shown to be inadequate by the facts noted in the case of the hypotheses of Jennings and Smith, and by the further fact that a secondary response R_2 may bind R_1 to S_1 even though it is incongruous with it and disjoin R_1 from S_1 though it is congruous with R_1. Thus a cat in a box, the door to which is opened, permitting escape and eating, *whenever the cat scratches herself*, will soon come to scratch as soon as put in the box, though there is no congruity between escape through a door and scratching. Again, if a cat is put into a box, X, with two alleys opening to the North from it, A and B, and if, whenever it advances two feet into alley A it is hit from behind with a club and so runs on out of the North end of A, whereas, if it advances two feet into alley B, it is given a piece of meat and hit gently from in front, the cat will, when put into X, be less likely to advance into A and more likely to advance into B. Yet the response of advancing into A produced the congruous secondary response of advancing further in the same direction, whereas the response of advancing into B produced the incongruous retreat to X.

Congruity and incongruity have, in and of themselves, no force to make and unmake connections. They seem to do so in certain special cases simply because congruity is, in those cases, a symptom of satisfyingness, and incongruity a symptom of annoyingness. The law of effect is primary, irreducible to the law of exercise, and with the latter is the moving force in all learning.

REMEMBERING

The words 'memory' and 'to remember' are used by psychologists in two senses, first to describe consciousness of a certain sort, and second to describe the permanent effects of experience. The following quotations from James' chapter illustrate the former usage:

"Memory proper, or secondary memory as it might be styled, is the knowledge of a former state of mind after it has already once dropped from consciousness; or rather *it is the knowledge of an event, or fact,* of which meantime we have not been thinking, *with the additional consciousness that we have thought or experienced it before.*

The first element which such a knowledge involves would seem to be the revival in the mind of an image or copy of the original event. And it is an assumption made by many writers that the revival of an image is all that is needed to constitute the memory of the original occurrence. But such a revival is obviously not a *memory,* whatever else it may be; it is simply a duplicate, a second event, having absolutely no connection with the first event except that it happens to resemble it . . . No memory is involved in the mere fact of recurrence. The successive editions of a feeling are so many independent events, each snug in its own skin. Yesterday's feeling is dead and buried; and the presence of today's is no reason why it should resuscitate. A farther condition is required before the present image can be held to stand for a *past original.* . . . And to 'refer' any special fact to the past epoch is to think that fact *with* the names and events which characterize its date, to think it, in short, with a lot of contiguous associates.

But even this would not be memory. Memory requires more than mere dating of a fact in the past. It must be dated in *my* past. In other words, I must think that I directly experienced its occurrence. It must have that 'warmth and intimacy' which were so often spoken of in the chapter on the Self, as characterizing all experiences 'appropriated' by the thinker as his own.

A general feeling of the past direction in time, then, a particular date conceived as lying along that direction, and defined by its name or phenomenal contents, an event imagined as located therein, and owned as part of my experience,—such are the elements of every act of memory. . . .

The objects of any of these faculties may awaken belief or fail to awaken it; *the object of memory is only an object imagined in the past* (usually very completely imagined there) *to which the emotion of belief adheres."* ['93, vol. 1, pp 648-650, *passim.*]

The second usage is clearest in such statements as 'He remembers perfectly how to swim and how to dance,' the

meaning being that the person can swim and dance as well as he ever could. There is here no question of the person's consciousness—no question of ideas about objects, his own past or anything else—but only of the permanence of certain effects of experience. It is clear enough in other cases where states of consciousness are involved, but where the words 'memory' and 'remember' refer, not to the nature of the states of consciousness but to the permanence of the connections whereby such and such a state of consciousness is evoked by such and such a situation. Thus, to say that a child remembers the multiplication table or the English equivalents of *sum, es, est* means that the situations, '4 x 9,'' '7 x 3,' *'homo sum,'* etc., will evoke certain responses, whether of movements or of states of consciousness, which have been bound to them in the past. We do not mean by such a statement to assert that the child thinks of his own past experiences of 4 x 9 or is in any wise specially conscious of himself or of the past. We mean simply that he can think or say or write 36, whereas the child who has forgotten his multiplication table cannot. Memory in this second sense, then, is simply the permanence of the results of learning —the tendency of any situation to evoke that response which has been connected with it.

It is with remembering in this second sense that we are here concerned. It is an original capacity of man—and of all other animals that can be properly said to learn. For learning itself implies at least some permanence in connections. Without it the law of use could not hold good, and the law of effect would be of no consequence if each strengthening of a bond by satisfying results vanished as soon as the satisfying results passed. Remembering has indeed been fully provided for in the description of the capacity to learn. So also has its opposite—forgetting—in the law of disuse, that, other things being equal, lapse of time weakens modifiable connections.

The exact working of this capacity and incapacity whereby connections when formed persist, but with weakening strength as time elapses, will be described in a second volume on the *Psychology of Learning.*

CHAPTER XIII

Summary, Criticism, and Classification

In three respects the inventory of the last nine chapters may innocently mislead. The fact that any one of the elements of an original tendency or any combination of tendencies or any combination of elements may, within certain limits, act by itself has not been emphasized. Age, sex, race and other causes of individual differences in the strength of original tendencies have been neglected. The early and incessant modification of original tendencies by their interaction under the conditions provided by physical and social surroundings has been taken for granted so absolutely that it may seem to have been forgotten. So the reader may have been left with an impression that each tendency named acts very definitely and exclusively as a unit, that some one typical original nature of man fits closely the original natures of all human individuals, and that each tendency of man's original nature remains in *statu quo* unless it is very vigorously attacked by special and artificial training. From time to time minor warnings against these false inferences have been given, and a brief statement of the facts here at the close of the inventory will suffice.

THE ACTION OF FRAGMENTS AND COMBINATIONS OF ORIGINAL TENDENCIES

It has been necessary for clearness and brevity to parcel out original tendencies into fairly clear-cut behavior-series, treating the situations and responses somewhat as if they were so many cups and so many saucers to be paired off for a tea-party. This rhetorical necessity of treating situations and responses more or less as indivisible and unamalgamable must not, however, leave the impression that they are so in fact. On the

contrary, as I have tried to show concretely in several cases, a situation as nature offers it may be only a part of one of the situations here described, or a compound of several of them, or of all sorts of fragments of them. The responses similarly act in fragments and in combinations. Original tendencies are no more like a set of locks fitted to a set of keys than they are like a witch's pot which gives off unpredictable effects when this toad or that snake's eye is thrown in.

Original nature is not a set of perfectly independent mechanisms any more than it is a hodgepodge for chance. It is a factory or hierarchy of mechanisms, with very many components, of which many coöperate in response to any one situation. An approaching man may, by the peculiar combination of size, rate of approach, gestures, facial expression, and cries which he offers, and by the peculiar combination of darkness, familiar surroundings, human companionship and physical contact, full stomach, wakefulness and so on characteristic of the concomitant situation, draw on a score of different responses.

There are also very many responses in the shape of inhibitions, facilitations, releases and readinesses *of other responses.* Man's nervous system provides not only a mechanism to make him run, but also probably other mechanisms which prevent or stop the former from acting, or make it act more vigorously, or start it acting, or put it in readiness to act.

In none of the higher animals is original nature of the simple cup-and-saucer, lock-and-key plan; and in man the complexity has so far baffled description. It is intellectual cheating to evade the difficulty by postulating magic powers like 'fear' which responds to 'danger;' but even the most honest effort goes nearly bankrupt in the face of the obligations of a matter-of-fact account of so intricate an organization of connections. The original tendencies of man act piece-meal and in combinations. The potency of a situation is a compound of forces. Its bonds are real, but there are so many of them that the best of inventories, if brief, would have to be a caricature.

THE VARIABILITY OF MEN IN ORIGINAL TENDENCIES

Could we define and measure the exact original nature of all human beings they would by no means be duplicates. Indeed, save by chance, no two would be absolutely so.* The structural arrangements or chemical constituents of the fertilized ovum which is the beginning of a human life are capable of a practical infinity of permutations and combinations. The eleven thousand millions of neurones in which the original connection system soon manifests itself probably never possess in two men identical connections and degrees of readiness to act. Gross external behavior does not misrepresent, but illustrates, everywhere the variability of men around the type of the human species.

In a later volume some account will be given of the nature and causation of individual intellects and characters, the inventory of this volume being obviously only a general sketch of the original nature of mán as a species.

THE MODIFIABILITY OF ORIGINAL TENDENCIES

In order to describe original tendencies at all, it is desirable to abstract strictly from the changes which they undergo by virtue of their mutual action, especially of the action of exercise and effect upon all the others. But in order to describe them truly, it is necessary to add to such a list of abstracted tendencies the codicil or reservation that the action of each at any time is conditioned by the man's experiences up to that time and is modified for the future by its own consequences.

The original nature of man contains within itself a principle of change, and the circumstances of the life led by modern man metamorphose almost every original tendency into habits which are much unlike it—even directly contrary to it. The old verbal contrast between two mythical entities—'instinct' and 'intelligence'—left an unfortunate disposition amongst psychologists to separate the habits formed with train-

*Except possibly a certain very small percentage of twin pairs.

ing sharply from the instincts given by nature. In the last resort all habits are formed in the service of instincts, and the great majority of human instincts function by being modified through training. Original nature and acquired nature do not exist side by side as alien races. The latter is generated from the former and combines back with it to form new hybrids. The original tendencies which have been listed in these chapters are less important in the cases where they manifest themselves nakedly as I have described them than in the more numerous cases where, disguised and transformed by training, they are constituent elements of the eventual nature of man.

A SUMMARY OF MAN'S ORIGINAL NATURE

These intricacies, combined with the insufficiency of knowledge, make the tasks of summary and classification well-nigh impossible.

It certainly is impossible to summarize the original nature of man without great risk of misleading. The inventory which has been made is, indeed, itself, too condensed to do full justice to the elaborate mental organization with which man meets his environment. But, accepting the risk, one may say that the original nature of man is roughly what is common to all men *minus* all adaptations to tools, houses, clothes, furniture, words, beliefs, religions, laws, science, the arts, and to whatever in other man's behavior is due to adaptations to them. From human nature as we find it, take away, first, all that is in the European but not in the Chinaman, all that is in the Fiji Islander but not in the Esquimaux, all that is local or temporary. Then take away also the effects of all products of human art. What is left of human intellect and character is largely original—not wholly, for all those elements of knowledge which we call ideas and judgments must be subtracted from his responses. Man originally possesses only capacities which after a given amount of education will produce ideas and judgments. And from the situations to which

he originally responds, must also be subtracted all ideas and judgments; for, again, his original tendencies are bound only to direct sense-presentations and feelings. To ideas, when he gets them, he responds originally only as he would to some direct presentations which they sufficiently resemble. Much, perhaps nine-tenths, of what commonly passes for distinctively human nature is thus not in man originally, but is put there by institutions or grows there by the interaction of the world of natural forces and the capacity to learn. To reduce the chance of misleading, the original nature of man may be summarized also by listing its essential differences from that of the primates in general. Consider the intellectual and moral equipment of the monkeys. Add to it certain important social instincts, notably those connected with the more refined facial expressions and the approval-disapproval series. Increase in intensity and breadth the satisfyingness of mental life for its own sake, widen the repertory of movements to include human facial expressions, finger and thumb play and articulated babble, enrich the fund of indifferent possibilities of secondary connections and give them the tendency to piece-meal action in very fine detail. The result will be substantially the original nature of man.

CRITICISMS

There is wide disagreement regarding the extent to which human thought, feeling and action are predetermined by nature irrespective of experience. According to one extreme view, so extreme that it might not now be endorsed by any competent psychologist, nothing is given by nature save the capacities to feel elementary sensations and affections and to make elementary muscular contractions. The child of himself responds at random, and, except for chance, alike, to a smile and to a scowl. So far as his own nature goes, he is as likely to reach away from an object fixated as toward it; as likely to swim, roll or burrow as to walk; and as likely to begin to walk on his hands as on his feet.

The other extreme is well represented by Stanley Hall, who

credits the original nature of man to-day with possessing in some degree nearly or quite all the tendencies which the race, even down to historical times, has acquired. Hall says, for instance:—

"Every element has shaped and tempered it (the 'psyche' or 'ego' or 'soul' or original nature of man). Its long experience with light and darkness, day and night, has fashioned its rhythm indelibly. Heat and cold, the flickering of flame, smoke and ashes, especially since man learned the control of fire, have oriented it toward both thermal extremes. Cloud forms have almost created the imagination. Water and a long apprenticeship to aquatics and arboreal life have left as plain and indelible marks upon the soul as upon the body. Sky, wind, stars, storms, fetichism, flowers, animals, ancient battles, industries, occupations, and worship have polarized the soul to fear and affection, and created anger and pity." ['04, vol. 2, p. 69.]

The inventory given in the last eight chapters will be criticised by many who prefer to explain intellect and character so far as they can, by a *tabula rasa* plus experience. They will regard it as intolerably lenient in admitting sheltering, specific fears, six or more specialized 'pugnacities,' mastery and submission, approval and scorn, and others of its main features.

An attempt to refute this contention that these forms of behavior are learned in the school of life would involve a survey of details in the behavior of man which is utterly beyond the scope of this volume. Nor would such a survey be conclusive. The general frame of mind which one gets, doubtless in part by sheer prejudice, from observing human behavior and others' reports of it, directs his decision in problems like these, where crucial tests are lacking: I could not prove the originality of these tendencies to myself. As was made clear at the outset, the inventory is in large measure the result of the author's unsupported observations and intuitions; and these are doubtless often in error.

That the inventory is much too generous to original nature may, however, be doubted in view of two facts of prime importance to one's general expectations from original nature.

First, the inventory here is really less generous than one which smuggles in a host of specialized tendencies under the guise of general faculties such as 'anger at opposition,' 'curiosity,' 'imitation' and 'ideo-motor action.' If man did originally make any movement or produce any sound which was made in his presence, the detail and complexity of the preformed connections for this one tendency would be greater than for all those listed in my inventory. The original framework of human nature is not simplified by replacing all the special bonds involved in escape from restraint, overcoming a moving obstacle, contra-attack, violence at sudden pain, combat in rivalry, maintenance of isolation in courtship, and responses to various thwartings, by one faculty—anger—which has the inherent power of being aroused by very many situations and of expressing itself in very many acts. Unless this anger is roused absolutely at haphazard and expresses itself just as probably by one movement as by any other, some special original bond is required between every one of the elements which can excite it and every one of the movements to which each such element leads. There is no gain in simplicity by fabricating an agency like anger or fear or sociability or curiosity to connect certain responses with certain situations. If it is not a set of mechanisms complex enough to make the connections, such a fabricated agency is nothing but a name for their possibility. Giving a single name to a compound fact does not simplify it.

The second fact of importance is that, if we hold to the matter-of-fact question of the unlearnedness of direct connections between observed situations and observed responses, impartial research has found new instincts in almost every field. The same studies which destroy confidence in 'instinct' as a faculty of all-around guidance, or in imitation as a tendency to create bonds between an act observed and the performance of the act, have lent support to the expectation that many more direct original connections exist in man than even the most generous list of twenty years ago included.

The inventory given in this volume will be criticised as too meager in one or another detail by students of various special human activities who have assumed, each for the activity in which he is interested, a more elaborate instinctive basis than I have described. It may be criticised as too meager throughout by those students of human nature who, like Stanley Hall, expect that the traits acquired by primitive and even recent generations of men have left their impress on original nature.

The following are samples of such possible criticisms:—No special religious instinct is listed here in spite of the universality of certain phenomena. No innate difference of response to 'right' from that to 'wrong' acts is listed here, in spite of the opinions of a majority of students of ethics and the authority of Lloyd Morgan, who says emphatically:

"Among civilized people conscience is innate. Intuitions of right and wrong are a part of that moral nature which we have inherited from our forefathers. Just as we inherit common sense, an instinctive judgment in intellectual matters, so too do we inherit that instinctive judgment in matters of right and wrong which forms an important element in conscience." ['85, p. 307.]

No report is made here of special tendencies to respond to the common animals which man has had under domestication for long ages and which, according to Stanley Hall, as quoted by Kaylor ['09], originally evoke a special affectionate interest. Acher ['10] tho far from clear, seems to think that digging caves and underground passages, burying objects, collecting, piling, throwing and hammering with stones, throwing snowballs, working and playing with strings, stabbing and cutting with edged objects, striking, whipping and pounding with appropriate objects are specific tendencies. Such would be expected to be original tendencies if man's past history has become ingrained in his inborn nature, but have been deliberately excluded from my list. The tendency to play in water, splashing it about with hands and feet, may seem on grounds of universality and of persistence in spite of prohibitions and punishment, more deserving of a place amongst unlearned responses

than attempted mastery, kindliness, and other forms of behavior included in my list. Bolton, for example, writes that:

"This universal love for water seems not to be due to experience alone, for all babes exhibit it in their earliest days, if conditions are supplied. It seems partly instinctive and of more than recent philogenic [*sic*] origin, and at least suggests a survival of the old-time life in an aquatic medium. This is not demonstrable, but the weight of all testimony is in that direction. How else can we account for the passionate love of children to paddle, to splash, ride on rafts, run out in the rain; for their intense delight in swimming, even going without meals, walking long distances, enduring severe punishments, etc., just for the sake of being in the water Many of these characteristics are exhibited by adults when the conventionalities of civilized life can be thrown off." ['99, p. 226.]

Against this last sample criticism I may offer a brief note of defense. It is, in my opinion, probable that the love of paddling, wading and swimming is wholly or in large measure due to the love of 'doing something and having something happen as a result,' and to the increased freedom of the body when fewer or more comfortable clothes are worn. Water is enjoyed in large measure for the same reasons that a sand-pile, a roomful of toys or a gymnasium is enjoyed. Merely being wet, as when wrapped in a wet sheet, is certainly not the situation producing the satisfaction. The baby perhaps enjoys being naked in the warm air even more than taking his bath. Children at the beach play out of the water with apparently as great enjoyment as in it. The argument from the commonness of aquatic life in our animal ancestry which Bolton emphasizes is, I think, against any specific original tendency in man to be drawn to, and to be satisfied by being in, the water *per se*. For the early generalized primate stock from which man probably sprang, probably instinctively *avoided* immersion, as do the present primates. Robinson seems sounder in his claim that the original human response to sinking or being suspended in water, is the generalized-primate response to lack of support. He says that in such a case man

"acts exactly as if he were endeavoring to climb. His

hands are alternately thrust upwards, with open clutching fingers, as if to grasp something above his head, and his legs move in unison with his arms in the same way as do those of an ape which is mounting a tree. That is to say, the limbs on the same side are lifted coincidently, as they are when a sailor is going aloft. There is a remarkable uniformity in the behavior of persons who cannot swim who find themselves suddenly immersed in deep water, which also strongly suggests that some instinctive tendency, inherent in, and possessed by, all human beings, is the prompter on such occasions." ['93, p. 728.]

As was stated in Chapter IV, the inventory does not include all the tendencies which I myself regard as unlearned. Consequently I should agree with many criticisms of its incompleteness. Important tendencies, such as the general moral sense referred to by Lloyd Morgan, would, however, have been included if I had seen reason to believe in their unlearnedness. The detailed consideration of such proposed additions to this inventory is out of the question here.

Space permits only two general principles of decision. One is that where some selfish interest or specialized doctrine has sought to establish itself by pleading the existence of a certain original tendency in man as a species, I have been suspicious and perhaps over-skeptical. For example, the origin of the plea that the love of ownership in the modern sense of property rights is the instinctive response to material objects and the instinctive situation evoking thought and labor, has possibly prejudiced me against it. The other is entire repudiation of the doctrine that the learning of past generations becomes the unlearned tendencies of the present. If umbrellas had been invented five thousand generations ago and carried whenever it rained by every one of my ancestors since then, I should still not expect a trace of an original tendency on my part to carry an umbrella on a rainy day. This principle will be defended in Chapter XV.

THE CLASSIFICATION OF ORIGINAL TENDENCIES

There are many rational classifications possible for man's original equipment, each having certain advantages. The important classifications are:—

By the functions which the tendencies perform
By the responses which are their end-terms.
By the situations which are their first-terms.
By their origin or affinities in development.

Classifications by function are commonest. Such have the advantage that the existing accounts of human instincts and capacities can be fitted to them easily. Since these accounts describe original tendencies by their results, rather than by the situations and responses which compose them, this is the only one of the four systems of classification which they suggest and the only one by which they can, as they stand, be ordered. This is also a disadvantage, however, in that it discourages more objective and exact descriptions of the tendencies. As a sample we may take that made by Kirkpatrick and quoted below. ['03, pp. 51-63.] It is one of the best of this type.

I. Individualistic or Self-Preservative Instincts
   - Feeding
   - Fearing
   - Fighting

II. Parental Instincts
   - Sex and courtship instincts
   - Singing
   - Self-exhibition
   - Fighting for mates
   - Nest building

III. Group or Social Instincts
   - To arrange themselves in groups
   - To coöperate for the common good in attack and defense
   - Seeking companionship
   - Desiring the approval of the group which one joins
   - Pride
   - Ambition
   - Rivalry

Jealousy
Embarrassment
Shame

IV. Adaptive Instincts

Tendency to spontaneous movement
Tendency for nervous energy to take the same course that has just been taken
Tendency to imitation
Tendency to play
Tendency to curiosity

V. Regulative Instincts

The moral tendency to conform to law
The religious tendency to regard a higher power

VI. Resultant and Miscellaneous Instincts and Feelings

The tendency to collect objects of various kinds and to enjoy their ownership
The tendency to construct or destroy and the pleasure of being a power or a cause
The tendency to express mental states to others of the species and to take pleasure in such expression
The tendency to adornment, and the making of beautiful things, and the aesthetic pleasure of contemplating such objects

No one, to the author's knowledge, has attempted to classify man's tendencies by their situations, for instance, into original behavior toward heat, cold, light-waves of each length, and so on through an orderly grouping of all the states of affairs which originally move man, though such a classification was doubtless in the mind of Stanley Hall when he arranged for his investigations of human behavior toward water, trees, clouds, frost, dogs, and the like. Classification by situations seems, at first sight, the most scientific of all four, and would be an impetus toward careful analysis of and experimentation with original tendencies. To provoke by one's classification, the questions:—'What does man, apart from training, do to white, black, red and yellow? To a temperature of twenty degrees, thirty degrees, forty degrees, fifty degrees? To falling, being in motion, being at rest? To wind, snow, rain, stars,

sun, moon? To human beings old, young, single, in a crowd? —is to make at least one step toward a usable account of what man's original nature is. But such a classification is very laborious and becomes enormously complicated. For example, the same object may be a different situation in each of its distances, or with each possible adjunct. It also is the case that no one of the stock classifications of external states of affairs—such as animal, vegetable, mineral, with the further groupings into vertebrate, invertebrate, and so on—is specially germane to original human behavior. Such a classification then, though it would be, if minute enough, a valuable stimulus and guide to research, would be somewhat pedantic, as a carrier of present knowledge, save in the case of responses of sensitivity. There it is of course already appropriate and already occasionally used.

Classifications by responses have the advantage of economy over classifications by situations. For the variety of human original responses, though greater than one is likely to fancy until he has tried to classify them, is of an order of magnitude far below that of the variety of situations. The stimulus and guidance to thought and investigation will be about the same regardless of whether we order the events of the world and ask what man originally tends to do to each, or order the events in man and ask to what outside stimulus each is the original response.

There is very great need for a series of painstaking studies of man's original responses to all the important things, events, qualities and relations in his environment. The foregoing chapters have shown how soon one comes to a stop when he tries to decide what man would, apart from training, think and feel and do in response to something rather than nothing, change and monotony, motion and rest, sour, bitter, sweet, salt, black, white, red, blue, wind, snow, rain, sunshine, water in each of its common forms, the various facial expressions and gestures and vocal sounds of man, etc., etc., etc.

There is great need also for a similar series of thorough-

going studies of just what the situations are which, apart from training, evoke the important movements of man's muscles and excitements of his neurones. We do not yet know surely what originally makes man laugh or cry, go to sleep and wake, smile and scowl, stiffen or tremble, or have the neurone actions corresponding to excitement, torpor, elation, depression, tension or relief. We have seen, for example, that laughter has been the subject of special study by Darwin, Hecker, Spencer, Gross, Hall and Allin, Bergson, Dumas, Kline, Sully, and many others, but without the attainment of a satisfactory account of what originally (or for that matter, on the whole) arouses it. Borgquist, ['06] examining the returns from a questionnaire, lists forty-seven (!) groups of causes of crying, but is unable to give an acceptable account of its original provocatives.

In proportion as such studies are made, classifications by the situation concerned or by the response concerned will accompany or replace classifications by the end attained.

Classifications by affinities in the development of the race—that is, by descent—though hitherto unconsidered, perhaps offer the most scientific means of grouping and ordering original tendencies. These tendencies have evolved in the same way that the circulation of the blood or excretion by the kidneys has evolved. Behavior as well as structure has its ancestral tree. If we knew perfectly the history of behavior in the world, we could start from the responses of our first progenitors, the protozoa; see each new tendency appearing as a slight variation or larger mutation on the basis of the tendencies already present; note which animals, and so which tendencies, had surviving offspring; and so group the tendencies of man according to their places in a genealogical table of instincts. Such a classification would be a 'scientific' or 'natural' one because it would arrange man's instincts and capacities for purposes of study in an order corresponding to their genesis in the real world, and so incite students to note the elements in which heredity carries along man's equipment and the possibilities for its future evolution.

CHAPTER XIV

The Anatomy and Physiology of Original Tendencies

Intellect, character and skill have their physiological basis in the structure and activities of the neurones and accessory organs which compose the nervous system. The original nature of man in these respects depends on the original structure and activities of the neurones.

The neurones are essentially threads of specialized protoplasm each connecting one part of the body with another. Like other elements of the body, they eat, excrete, grow and die; but their special functions in the animal's life are *sensitivity, conductivity,* and *modifiability.* Sensitivity means the capacity to be excited to action at one end by one or many agencies. Conductivity means the capacity to transmit the action thus excited, or some consequence of it, to the other end of the neurone. Modifiability means the capacity to change in accordance with use shortly to be described.

They are arranged in an elaborate system of *receptors,* easily accessible to important influences within and without the body, *effectors* in intimate connection with organs for action, and *connectors* which lead from the receptors to the effectors. Each neurone of this total system has its special connections with the outside world, with the other organs of the body, or with other neurones.

THE STRUCTURE OF THE NEURONES

Figures 4 and 5 show typical neurones, varying widely in shape, but maintaining the common element of a thread-like body suitable to put one part of the animal in touch with other parts—to conduct stimuli from one part of the body to another

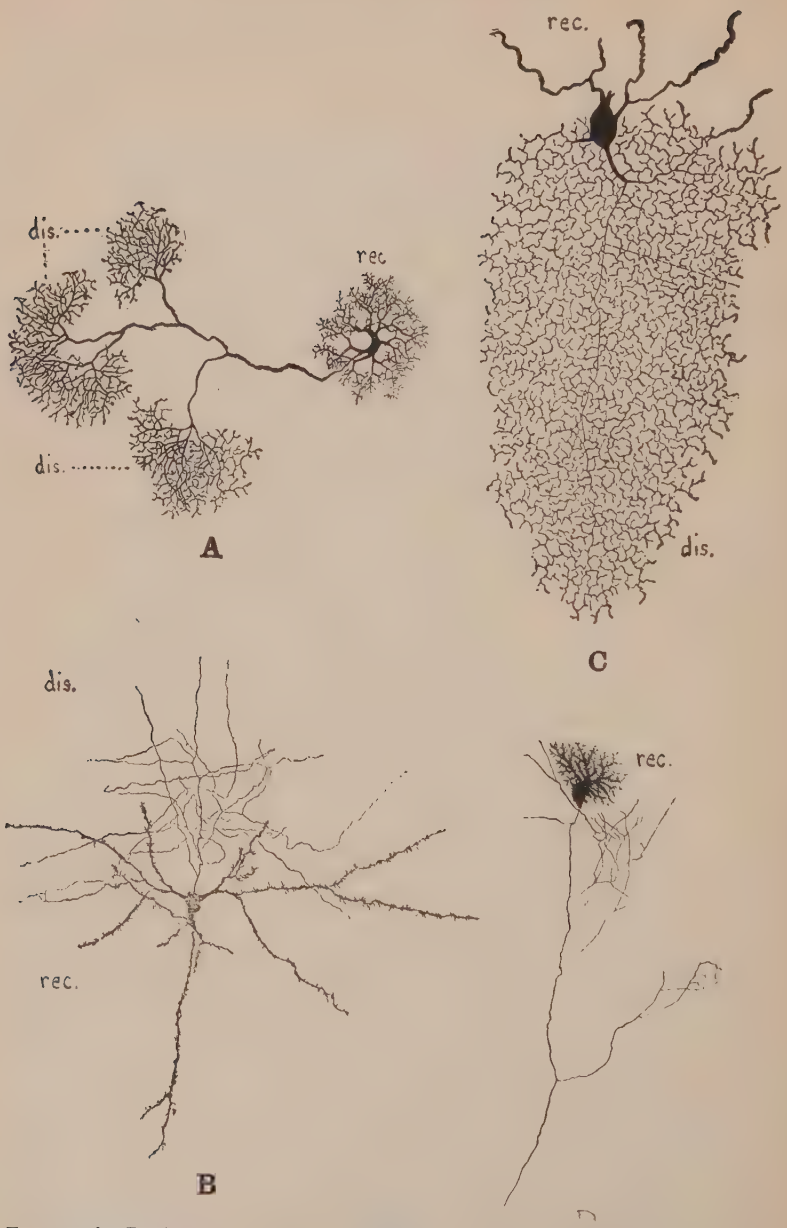


FIG. 4. A, B, C, and D. Four neurones. The discharging end of D is not fully shown, being far beyond the limits of the drawing.
A is after Kölliker ['02, p. 834], after Marenghi.
B is after Kölliker ['96, p. 654].
C is after Van Gehuchten ['00, vol. 2, p. 175].
D is after Kölliker ['96, p. 349].

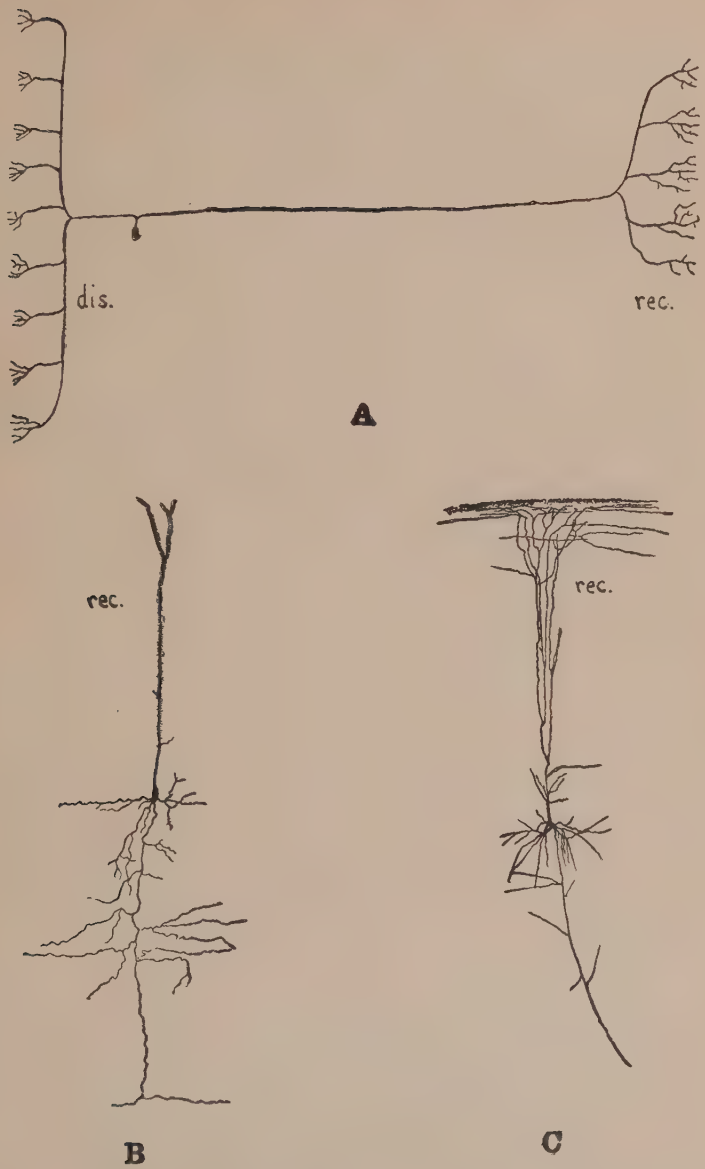


FIG. 5. A, B, and C. Three neurones. The discharging ends of B and C are not shown, being far beyond the limits of the drawing.
B is after Barker ['01, p. 70]. C is after Kölliker ['96, p. 46].

—to let what happens to one part influence what is done by another part. For convenience I have marked the receiving end in certain cases *r*, and the discharging or transmitting end *dis*. It should be noted that in the drawings the diameter of the neurones is necessarily enormously exaggerated in comparison with their length. A neurone may be two feet long, but so small in diameter that a hundred side by side would make a line no wider than one of the lines in the drawings.

Figures 6 and 7 show representative structures where the receiving ends of the neurones are in connection with events outside or inside the body.

Figures 8 and 9 show representative structures where the discharging ends of neurones are in connection with muscles.

Figures 10, 11 and 12 show representative synapses or places of connection between the discharging end of one neurone and the receiving end of another neurone.

THE ARRANGEMENT OF THE NEURONES

Figures 13, 14 and 15 show, more or less schematically, certain cases of the arrangement of neurones in series to form conduction-lines or conduction-chains. The whole nervous system is a combination of millions of such conduction-chains. The neurones concerned in the behavior of a single man probably exceed in number by a thousand-fold all the telephone lines* in the world, and a description of the details of their arrangement, if such were known, would be an almost endless task.

Four general features of the original arrangement of man's neurones may be specially noted. First, the system as a whole is on the plan of a system of conduction-units running from parts of the body where events important to the life of the animal are 'sensed' or allowed to impress him, to parts of the body by which he 'reacts to' or adapts himself to, or changes his behavior as result of, these events, *via* a very complex

*Counting as a "line" every wire length which acts as a unit.

FIG. 6. The receiving ends of various first sensory neurones, or receptors.
A. Receiving ends around the base of hairs (in the mouse).
B. Cross section of the tissue shown in A.
C. Neurone endings in epithelial cells.
D. Endings around pigment cells.
E. An ending in the lining of the oesophagus.
F. An ending in a tactile corpuscle.
G. Endings in the *papilla foliata; g*, taste-buds with *intra-* and *circum-*gemmule neurone-endings; *i, inter-*gemmule neurone endings.
H. Endings of the rods and cones in the retina of man
A, B, C, and D are after Edinger ['96, p. 42], C being after Bethe and D being after Eberth and Bunge. E is after Barker ['01, p. 362], after Retzius. F is after Barker ['01, p. 386], after Smirnow. G and H are after Kölliker ['02, p. 28 and p. 820].

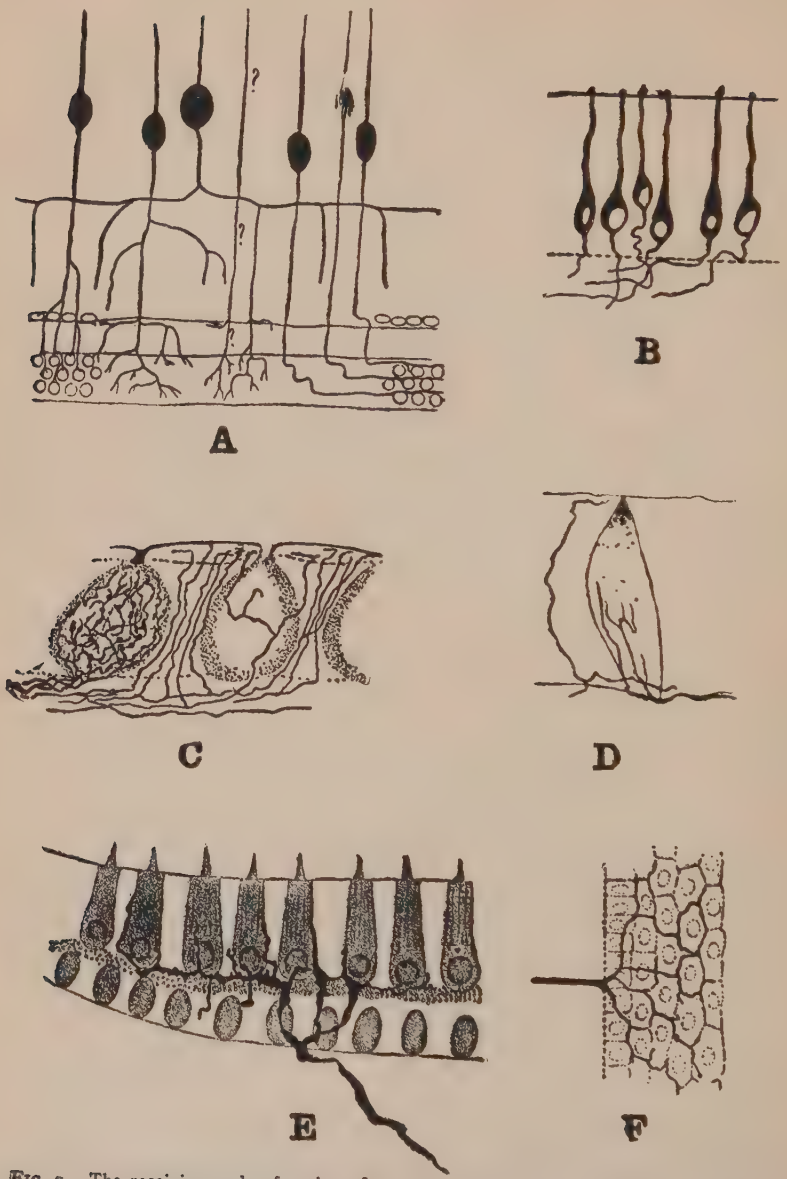


FIG. 7. The receiving ends of various first sensory neurones or receptors (continued).
A. Ends of neurones in the *Lamina spiralis* and organ of Corti. The ending marked ? may be a discharging end.
B. Ends of the first olfactory neurones in the nose.
C and D. Taste-buds and the receiving ends of gustatory neurones.
E. A receiving end of a neurone in the *macula acustica sacculi*.
F. A sensory neurone ending in the skin.
A is after Kölliker ['02, p. 952]. B is after Van Gehuchten ['00, vol. 1, p. 244]. C is after Barker ['01, p. 527], after v. Lenhossék. D is after Kölliker ['02, p. 29]. E is after Barker ['01, p. 502], after v. Lenhossék. F is after Van Gehuchten ['00, vol. 2, p. 372].

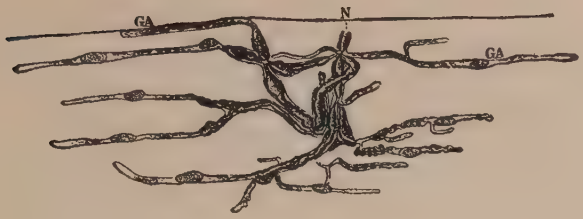


FIG. 8.

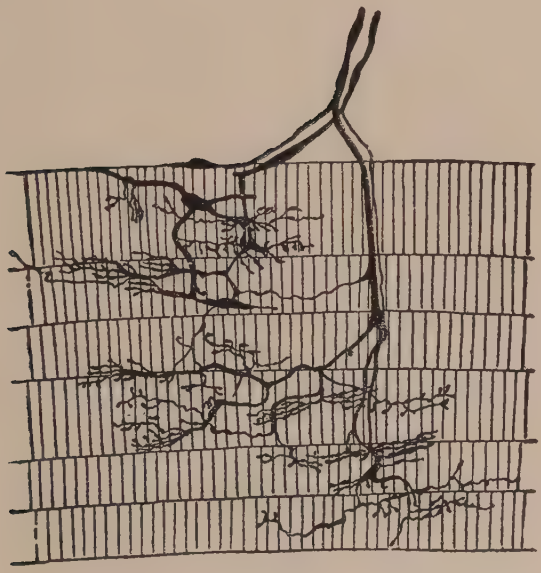


FIG. 9.

FIG. 8. The discharging end of a motor neurone on the gastrocnemius muscle of the frog. After Barker, after Schiefferdecker, after W. Kühne.

FIG. 9. The discharging ends of neurones in striped muscles of the white rat. After Van Gehuchten ['00, vol. 1, p. 205].

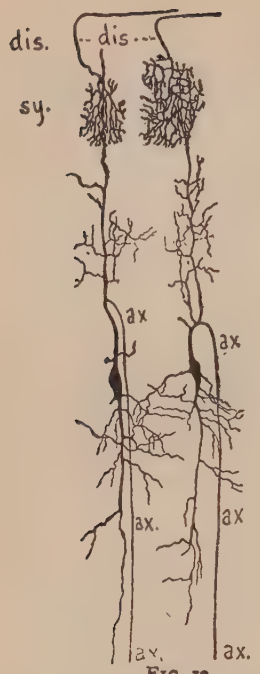


FIG. 10.

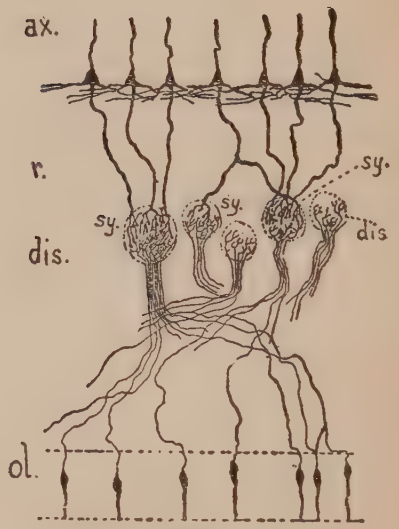


FIG. 11.

FIG. 10. The discharging ends of two neurones of the optic nerve (dis.) in synapse (sy.) with portions of the receiving ends of two neurones of the optic lobe. These two neurones are shown in part only in the figure. Their axones (ax.) continue far beyond the limits of the drawing. After Van Gehuchten ['00, vol. 2, p. 250].

FIG. 11. The olfactory receptors, or first sensory olfactory neurones (ol.), their discharging ends (dis.), in synapse (sy.) with the receiving ends (r.) of seven of the second sensory olfactory neurones. The axones of the latter (ax.) continue far beyond the limits of the drawing. After Van Gehuchten ['00, vol. 2, p. 287].

switchboard or set of relay stations permitting a very great variety of combinations, redirections, shuntings and retardations of the conducted currents. Second, in particular, there are arrangements whereby several neurones may discharge into one neurone as shown schematically in Figure 16, and in a real case in Fig. 17, so that there can be a convergence of stimuli separately initiated toward a common final path. Third, there are arrangements whereby one neurone may discharge into several neurones as shown schematically in Figure 18, and in a real case in Fig. 19, so that there may be a distribution or

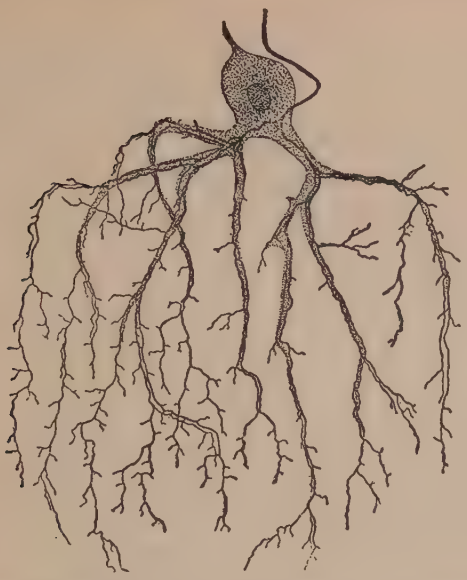


FIG. 12. A typical synapse in the cerebellar cortex. The discharging end-branch of a neurone intertwined with and applied closely to the surface of the receiving end of a Purkinje neurone. The former is shown in full black; the latter in stipple. The full detail of the latter is not shown. After Johnston ['06, p. 241].

diffusion or varied transmission of one initial stimulus to many final paths.

Fourth, the connecting, or associative, or 'switchboard,' neurones form, especially in man, an apparatus for redirection of stimuli which is almost infinitely complex and which is extraordinarily apt for varied transmission, so that the same stimulus may, according to minor coöperating conditions, be conducted to many different final paths, and so that many different stimuli may, according to some common feature, be conducted to the same final path. The varieties of connections which appear in the case of the instincts of multiform mental and physical activity, curiosity, manipulation, visual exploration and vocalization, and in the millions of habits which develop from these instincts, have a fit mechanism in this very sensitive, very complex and very modifiable switchboard arrangement of man's neurones.

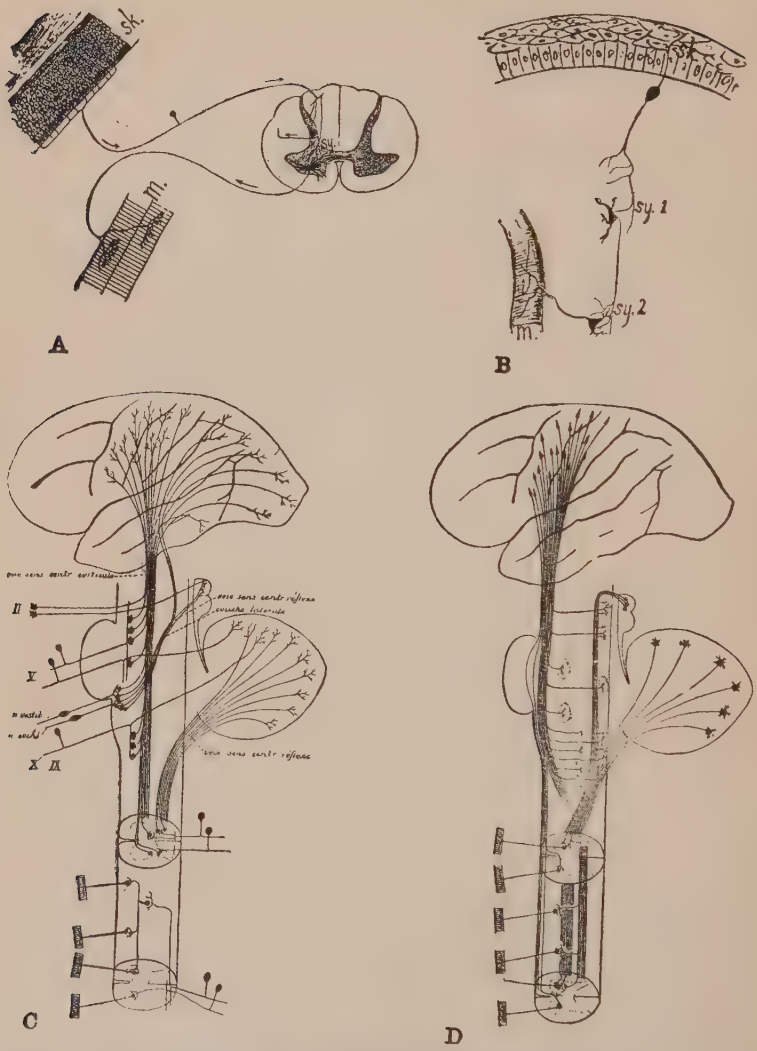


FIG. 13. A, B, C, and D. The arrangement of neurones in series to form conduction lines or continuous chains. A shows two neurones forming a chain from the skin (sk.) to the muscle (m.) via the synapse (sy.) in the spinal cord. B shows three neurones forming a chain from the skin (sk.) to the muscle (m.) via the synapses sy. 1 and sy. 2. C shows at the bottom chains such as are shown in A and B except that the skin and receiving part of the first neurone are not shown. C shows, in the upper three-fourths of the diagram, parts of other chains, leading from the first or second sensory neurones to the cortex. D shows parts of chains leading from the cortex to the muscles. A is from Van Gehuchten ['00, vol. 1, p. 517]. B is after Edinger ['96, p. 31]. C and D are after Van Gehuchten ['00, vol. 2, p. 513 and p. 512].

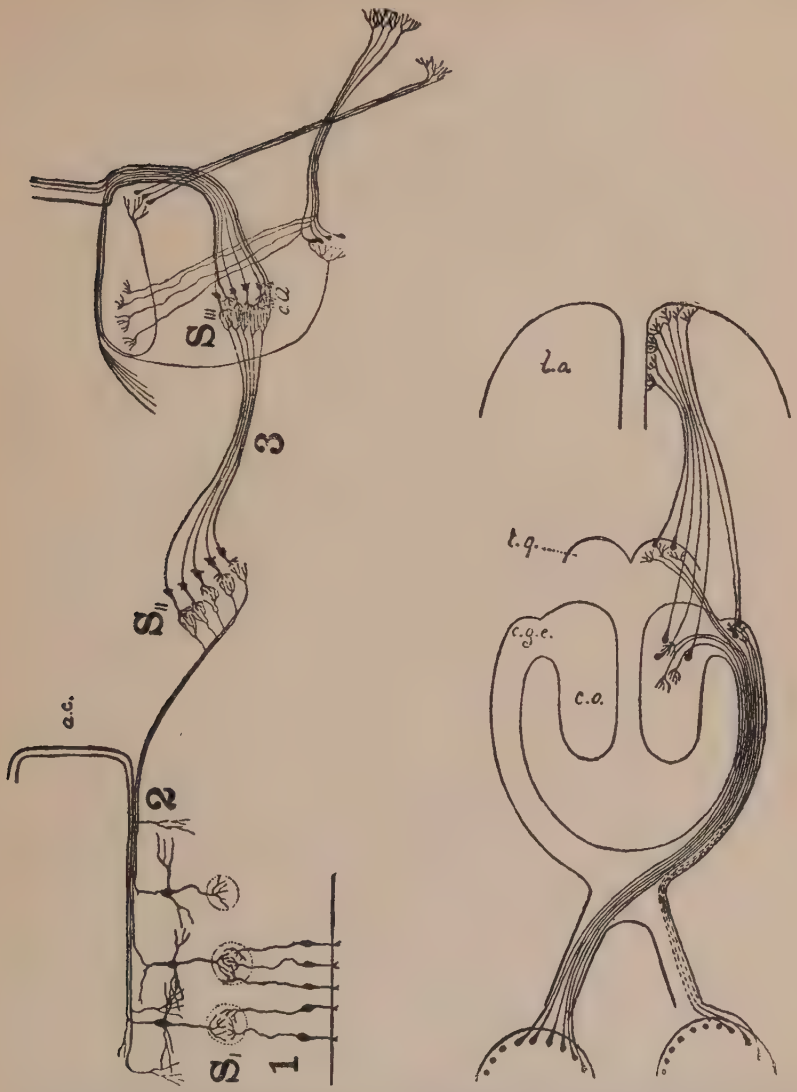


FIG. 14. Shows the chain of neurones conducting stimuli from the olfactory sense organ to the Cornu Ammonis, (*c. a.*) and thence in various directions to make further connections. The neurones marked 1, 2 and 3 designate in order the first three links of this chain, the synapse between the first and the second sets of neurones, the second and the third and so on being marked S I, S II, and S III. The neurones of group 2 shown cut off at *a. c.* are neurones which conduct across to the other hemisphere of the brain. After Van Gehuchten ['00, vol. 2, p. 294].

FIG. 15. Shows part of the chain of neurones which, beginning in the rods and cones of the retina, continue to the occipital lobe of the brain. The last two links in the chain are shown here—the neurones which form the sensory part of the optic nerve receiving stimuli in the retina and discharging across synapses in the corpora quadrigemina, external geniculate bodies and optic layer to neurones which conduct thence to the occipital lobe. After Van Gehuchten ['00, vol. 2, p. 253].

FIG. 16. Schema of Convergence.

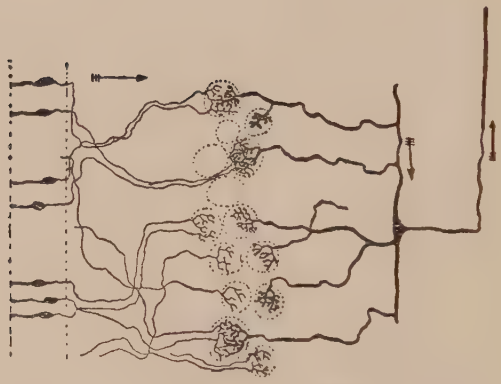


FIG. 17. Convergence in the Olfactory Receptors.

FIG. 18. Schema of Distribution.

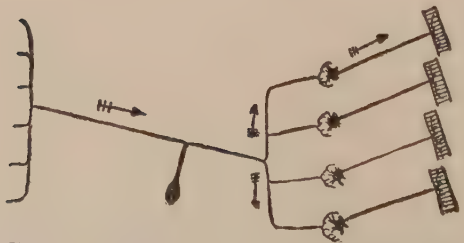


FIG. 19. Distribution in a Spinal Reflex Path.

An original bond between a situation and a response human behavior has as its physiological basis an original e of conduction of the physiological action aroused in cert neurones toward a certain final path rather than toward a other. The original arrangement of the neurones where the discharging end of a given neurone A, is near to the rece ing ends of B, C, D, etc., and remote from the receiving en of X, Y, Z, etc., is the main determinant of what responses sensation and movement the given situation will provo Original connections in behavior depend in large part upon original location of neurones in the brain—the original d tances between the discharging ends of the neurones severa and the receiving ends of all others.

They may depend upon other facts also. The synap between the discharging end of A and the receiving ends B, C, and D might conceivably be identical, so far as concer the distances A_{dis} to B_r, A_{dis} to C_r, and A_{dis} to D_r; and the ease of conduction might be very different in the th cases. Just as three membranes may vary in permeability by certain substance, or as three joints, one of copper, one of gl and one of rubber, would vary in resistance to the electric cu rent, so the three synapses—A→B, A→C and A→D—m vary in resistance to the stimuli conducted by A, otherwise th by differences in mere distance. If there were such variatio in the permeability of 'synapses of equal distances,' and if th were original in man, they would be a second determinant the path that any given stimulus would take—and so of response that any given situation would originally provo Proximity of neurones in space, then, there must be as a ba for connections in behavior; a nerve impulse cannot jump inch from the discharging end of one to the receiving end another. Permeability of some special sort may be an ad tional requirement.

SENSITIVITY AND CONDUCTIVITY

About the detailed physiology of *sensitivity*—the capacity of a neurone to be aroused by certain events at its receiving end (or, much less frequently, along its course)—very little is known. That little is not specially relevant to our purpose. The same is true of *conductivity* within a single neurone. What the action of a neurone is, whereby something happening at the receiving end makes something happen at the discharging end, is unknown; and the acceptance of one or another of the various present hypotheses would not alter any conclusion to be stated here. Conductivity over a chain of neurones involves obviously sensitivity, discharge, and conduction across the synapses, as well as mere conductivity within the neurones taken singly. That there is some specialized action corresponding to the discharge and conduction across the synapse seems probable, but what it is cannot be affirmed.

THE PHYSIOLOGY OF THE CAPACITY TO LEARN AND OF READINESS

The modifiability of a neurone might consist in changes in it:—(1) whereby its form was altered so that its receiving end was in different spatial relations to the stimulating agents, or so that its discharging end was in different spatial relations to the neighboring receiving ends; (2) whereby its receiving end was more or less sensitive to forces acting on it; (3) whereby it offered more or less resistance as a conductor, or otherwise changed its conducting action; (4) whereby it discharged in a different way, or (5) whereby other differences were produced.

Its modifications in the course of growth obviously include the first sort—alterations of its spatial relations,—as is shown roughly in Figures 20 and 21. So also do the modifications produced in it by certain diseases. What modifications are produced in a neurone by its own ordinary activities are matters largely for hypothesis.

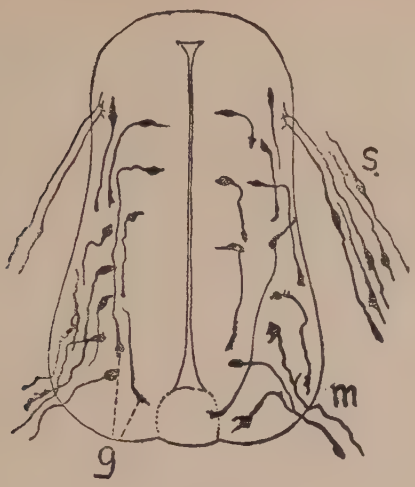


FIG. 20.

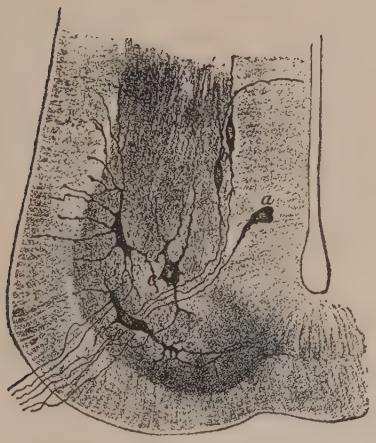


FIG. 21.

FIG. 20. Immature neurones in a section of half of the spinal cord of a chick at the third day of incubation. After Van Gehuchten ['00, vol. 1, p. 282], after Ramón y Cajal. The neurones shown here will grow to a complexity equal to that of those shown in Figs. 4 and 5. The ends of the five neurones shown under s. which run toward the centre of the diagram will grow into the spinal cord to form long axones with many collaterals each branching in an elaborate terminal arborization in close proximity to some associative or motor neurone; the other ends of these neurones will grow out to the surface of the skin or elsewhere.

The four neurones at the left of m. will grow out into the body to connect with certain muscle fibres. The other neurones will also grow in such a way that their ends assume special space relations to the ends of other sensory or motor neurones. The two ends of neurones at g. are growing parts or growing 'cones.'

FIG. 21. Neurones in various stages of growth. A very early stage is shown at *a;* a somewhat later stage at *b;* neurones whose receiving ends have something like their eventual complexity are shown at *c.* After v. Lenhossék ['95, p. 92].

The safest provisional hypothesis to make about the action of the neurones singly is, in my opinion, that they retain the modes of behavior common to unicellular animals so far as is consistent with the special conditions of their life as elements in man's nervous system. This conservative hypothesis, together with the unanalyzed facts of sensitivity, conductivity and the general facts of the arrangement of neurones, gives a fair working hypothesis concerning the physiological basis of the original satisfiers and annoyers, and of the capacities for learning and remembering—that is, of the laws of exercise and effect.*

The hypothesis is, very, very briefly, as follows: The life-processes of a neurone are (1) eating, (2) excreting waste products, (2) growing, (4) being sensitive, conducting and discharging and (5) movement. The movements or changes of position made by it are restricted to its ends. It may then be, according to its physiological state, more or less ready or unready, disposed or indisposed, to *eat,* to *excrete,* to *grow,* to *play its part in receiving and passing on a stimulus,* and to *move.* Activity in receiving and passing on a stimulus makes it ready to eat. When its life-processes, other than movement, are going on well, it continues whatever movement-activity it is engaged in; when its life-processes, other than movement, are interfered with, it manifests whatever movements such interference evokes until the interference ceases. The movements possible for it are slight extensions or retractions at its ends (including the ends of its collaterals).

The neurone then lives much as would an amoeba or para-

*The attempt made here to give a physiology of the adaptive element in learning—of modifiability in favor of the satisfying—is too premature and speculative to be of much value; and the discussion of it, without reliance upon technical acquaintance with the physiology of the neurones and the behavior of the micro-organisms, is necessarily inadequate. I have abbreviated it as much as is consistent with giving the reader some idea of how the complexities of human behavior may be found in the end to reduce to compounds of very simple behavior-series in the neurones. The reader who finds it puzzling or uninstructive may pass by the rest of this chapter.

mecium which had been differentiated to make conduction its special trade and which had become fixed immovably save for a few extremities here and there.* For the life-processes of eating, excretion and growth to go on well (or to be interfered with) means much the same in the case of the neurone as in the case of any single-celled animal.

For the life-process of receiving and passing on a stimulus to go on well means that only such stimuli are being received as can be discharged, and that enough stimuli are being received and discharged to prevent any inner disturbance due to the lack of such activity. Interference with the life-process of receiving and passing on a stimulus may be by the reception of stimuli too strong or too long-continued to be discharged, or by inner disturbances which adequate conductive activity would relieve.

If this hypothesis proved to be correct, *conduction by a conduction unit ready to conduct* would be restated as *the relief of interference with the life-processes of the neurones concerned*—relief by the destruction of an inner disturbance by means of adequate conductive activity. *For a conduction unit ready to conduct* NOT *to conduct,* would mean that such *an inner disturbance remained. Conduction by a conduction unit unready to conduct* would be restated as *interference with the life-processes of the neurones concerned by the receipt of a too intense or too long-continued stimulus.*

If this hypothesis proved to be correct, the *capacity to learn and remember* could find its physiological basis in the movement-process of the neurones. A modifiable neurone would, by the hypothesis, maintain that movement-action—and so those spatial relations with other neurones—whereby its life-processes other than movement went on well. Now, for the neurone's life-processes of receiving and transmitting stimuli to go on well in a given state of affairs *is* the physiological fact

*Just that is essentially what has happened in the differentiation of nerve-cells from generalized body-cells.

that we mean when we say that the state of affairs is satisfying to the animal. For this conductive process in the neurones to be interfered with in a given state of affairs is the physiological fact that we mean when we say that the state of affairs is annoying.* By the hypothesis, in the latter case the neurones move so as to hold some new spatial relation to neighboring neurones. The neurones are, then, by the hypothesis, widening the gaps in those synapses conduction across which causes discomfort; are trying other spatial relations; and are maintaining those spatial relations—preserving the intimacy of those synapses—conduction across which causes satisfaction.

Each neurone, by so moving as to preserve a healthy condition in its workings as a receiving and transmitting organ, would be giving up those synaptic bonds conduction across which produced annoying states of affairs, and maintaining those which produced satisfaction. The law of effect would be a secondary result of the *ordinary avoiding reaction* of unicellular organisms coöperating as elements in the animal's brain. The acquired connections of man's intellect and character would be the result of the unlearned tendencies of his neurones to do nothing different when all was well with them and to perform whatever different acts were in their repertories when their life-processes were disturbed. The learning of an animal would be the product of the unlearned responses of its neurones.

In the above argument I have, chiefly to make a somewhat

*The student who is interested in comparing the hypothesis presented here with others to the same purpose will find an admirably clear and systematic discussion of many of the early theories of the physiological basis of desirability and intolerability in Chapters IV and V of Marshall ['93]. This author uses the terms *pleasure* and *pain* to include, not only certain special voluptuous sensations and the sensations due to burns, pricks, inflammations and the like, but also the feeling-tone of any experience, whereby a man, apart from any objective feature of the experience, would judge it to be intrinsically desirable or undesirable. His problem is therefore, specifically, that of discovering the physiological basis of the conscious states which would, in and of themselves, be satisfiers and annoyers. But the theories which he describes and the evidence which he discusses bear on the wider problem.

subtle theory easier to understand, assumed *movement*—spatial change—as a life-process of the neurones. But *any process* whereby the neurone changes the nature of its connections with other neurones will serve all the purposes of the argument. The reader may, for instance, substitute appropriate terms referring to 'the greater or less permeability of a membrane' in every case where, in the last two pages, I have used 'movement of the end of a neurone in one direction or in another.' The essence of my account of the physiological mechanism of learning may be stated as follows, independently of any hypothesis about the power of the ends of a neurone to move. "The connections formed between situation and response are represented by connections between neurones and neurones whereby the disturbance, or neural current, arising in the former is conducted to the latter across their synapses. The strength or weakness of a connection means the greater or less likelihood that the same current will be conducted from the former to the latter rather than to some other place. The strength or weakness of the connection is a condition of the synapse. What condition of the synapse it is remains a matter for hypothesis. Close connection might mean protoplasmic union, or proximity of the neurones in space, or a greater permeability of a membrane, or a lowered electrical resistance, or a favorable chemical condition of some other sort. Let us call this undefined condition which parallels the strength of a connection between situation and response the intimacy of the synapse. Then the modifiability or connection-changing of a neurone equals its power to alter the intimacy of its synapses."

"A neurone modifies the intimacy of its synapses so as to keep intimate those by whose intimacy its other life-processes are favored and to weaken the intimacy of those whereby its other life-processes are hindered." When its feeding, excretory and conducting processes are going on well, it leaves whatever condition obtains at the synapse, undisturbed. When, on the contrary, feeding, excretion or conduction is disturbed, it makes whatever changes in its synapses it is capable of.

Thus certain synaptic intimacies are strengthened and others weakened, the result being the modifiability of the animal as a whole which we call learning. The simple avoiding-reaction of the protozoa, inherited by the neurones of the brain, is the basis of the intelligence of man. The learning of an animal is an instinct of its neurones.*

THE PHYSIOLOGY OF DELAY AND TRANSITORINESS IN ORIGINAL TENDENCIES

The physiological basis of the delay of certain original tendencies till various periods after the beginning of the individual's life, and of the waning of transitory instincts in cases where they have not been preserved as habits by adequate encouragement, is the waxing and waning of certain spatial arrangements of neurones, of lowered resistances at certain synapses, and of the readiness and unreadiness of certain neurones to receive and transmit stimuli.

Neurones grow, so that the discharging end of neurone A may be very much nearer the receiving end of neurone B at the age of ninety months than it was at the age of nine. They may, and probably do, abort in part, so that by age and disuse neurone C may be in less intimate synapse with neurone D at ninety months than at nine. Whatever, other than spatial proximity, makes a synapse intimate, may similarly wax and wane by the mere impulse of inner growth. The neurones that were disturbed by failure to conduct in childhood may, by the mere inner changes of maturity, come in youth to be disturbed by conduction. What is the healthful amount of stimulus for certain neurones in youth may in old age be an intolerable burden to them.

The rise of new original tendencies year by year after birth does not, probably, imply the addition by growth of new neurones. That process is completed or nearly completed very

*The matter quoted above is from the author's *Animal Intelligence* ['11, p. 246 f.].

early.* Nor does the loss of transitory instincts probably imply, as a rule, the death and absorption of once active neurones. These commonly remain, but with different or inactive connections.

The physiological parallel most often assigned to the development of delayed instincts and capacities in educational literature, is the *medullation* of the neurones concerned therewith. Thus Hall, in summarizing Flechsig's view, says that 'medullation, myelinization, or the sheathing of the fibres . . . is generally held to be the surest concomitant of the development of their function.' ['04, vol. 1, p. 109] Burk says: "The conclusion has now passed into general acceptance that when a nerve fibre acquires its fatty sheath, or becomes medullated as is said, it is then functionally mature. . . . The significance of medullation, once established, becomes a key of great value in determining the order in which the various parts of the nervous system develop." ['98, p. 12 f.]

This hypothesis—that the formation of the medullary or myelin sheath about the neurone along the part of its course where such a sheath is usual, is necessary in order that the neurone be able to function—seems from later work to be gratuitous and improbable. There is no need to suppose that the absence of a myelin sheath debars a neurone from functioning or that its presence gives much aid thereto. None of the neurones in invertebrates have the myelin sheath. It is most probably a means of better insulation. Watson, who subjected the question to experimental tests in the case of the rat, found no such correlation between the progress of medullation and progress in intellect and skill, and says, in conclusion: "Why one tract should become medullated sooner than another we can at present answer in the case of the man no better than in the case of the rat." ['03, p. 122]

*Donaldson ['95, pp. 160, 161 and 171] estimates that the process is completed as early as the third foetal month.

CHAPTER XV

The Source of Original Tendencies

The original nature of a man is, in the last analysis, the union of germ and ovum from which he develops. In that union his individual life begins.

Hence, the first step in a straightforward attempt to find out the origin and development of unlearned tendencies would be to find out to what features in the fertilized ovum each was due. The originating forces, whatever they are, have produced the instincts and capacities of the animal by producing these substances and structures in the germs. Knowledge of the constitution of the germs is needed if we are to trace his nature to its source. That knowledge, unfortunately, is for the most part lacking. No biologist could tell from examining a fertilized ovum what instincts it would in its later life display, nor could he tell from full knowledge of an animal's instincts what corresponding features to expect in its germ cells. Of not a single instinct do we know the germ basis or determiner.

Science is consequently forced for the present to argue from present *behavior* to ancestral *behavior* with only the vaguest knowledge of the germs which are the connecting link. The question has to be framed concerning what in our ancestors produces a given tendency in us, irrespective of the middle stage, the facts in the germs which carry the fund of tendencies from them to us.

The familiar answers to this question are, as is well known, (1) that unlearned tendencies are *inherited habits,* the perpetuation as a gift of what was once acquired by experience, and (2) that they are *inherited germinal variations,* produced by

subtle forces, not by the learning of individuals, and perpetuated because the individuals possessing them produced more, or longer-lived, offspring.

THE HYPOTHESIS OF THE TRANSMISSION OF ACQUIRED TRAITS

Whether we are by nature* what our parents were by nature alone or what they were by nature plus training, may be argued from two points of view. The probability of the latter event may be estimated from our knowledge of the physical relations between parents and offspring; or its actual occurrence may be determined from evidence. It is beyond the purpose of this book to present even a summary of such arguments pro and con. Indeed, except for the need of a statement limited to the inheritance of acquired mental traits, it would be unwise to add a new chapter to the voluminous discussions already in print.†

Some matters seem fairly sure.

1. Whatever changes occur in the nature of the chromatic substance in the nuclei of the germs and ova of the parents will influence the original nature of the offspring, for the nuclei of the germ and ovum *are* the original nature of the offspring. And nothing else will.

2. The germs and ova are made directly from the germ plasm (ovaries and testes) of the parents, not from their bodies in general. Just as the bone marrow makes blood, or the cells of the neural tube the nervous system, so the germ plasm makes the germs and ova.

3. The cells which are specialized to form the germ plasm —that is, to do the work of producing the next generation—

*It will be observed that antenatal influences from the mother are excluded from the discussion. A mother may, for instance, acquire diseases and transmit them through the blood, but transmit them by infecting the growing child, not by altering the quality of its original nature.

†For an admirable summary of the facts, see J. A. Thomson's *Heredity*, pp. 164-249.

are set off and begin their more or less separate careers long before the individual is born.

4. The line of inheritance is thus from germs to germ plasm to germs to germ plasm and so on.

5. The germ plasm is connected with, and related to, other structures in the body, including those of the central nervous system, in no more intimate way than are the other structures amongst themselves. The nervous system influences the growing germ or ovum as it may influence the cells of the liver or heart or skin.

6. No known mechanism exists by which such alterations of the brain's structure or of the quality of the brain's tissues as would correspond to changes in intellect and character. might produce in the germs changes fitted themselves to become, in the adult form, similar structures or qualities to those which caused them.*

7. The acquisition of specific mental traits by an individual seems thus unlikely to modify his germs so as to reproduce the specific trait acquired. With very general traits (such as mental vigor or weakness, health or degeneracy) the case might well be different. Such general mental traits might be correlated with bodily conditions which would include the germ plasm as well as any other parts of the body. The correlation, however, is by no means perfect. As to precise measures of how far acquired conditions of general health involve changes in the germ plasm and of how far such changes influence mental qualities in the offspring, there are none.

The obvious way to settle the question is not by contemplating these inferences from present knowledge of the process of development, but rather by making the crucial experiment

*It should, however, be said that Professor Jacques Loeb has suggested (*Monist*, Vol. VII., pp. 481-493) that in some cases of instinctive mental traits the organic basis may be the presence of some chemical substance, and that in these cases the change during life in the nature or amount of such substance might directly affect the germs so as to perpetuate the acquisition. This possibility is, so far as human mental traits are concerned, a matter of speculation.

of letting animals acquire some mental traits and observing the nature of the offspring. No such experiments of a decisive nature have been made. If, for generation after generation, mice were offered palatable food always in the shape of yellow cubes smelling of grease and unpalatable food always in the shape of white balls smelling of cheese, were kept in a cage so arranged that on going into a certain alley they always received an electric shock, and were otherwise given a chance to learn certain habits, an observer could measure, for generation after generation, the quickness of formation of these habits and detect the slightest improvement. Even so few as ten or twenty generations would thus give a probable answer to this fundamental question.

The popular idea of evidence on the question is as follows: "A studied mathematics and became a great mathematician. So was his son. His father's studies must have helped to make him so." The retort is of course easy: "Why was the father a great mathematician? Because of his original nature. Why was the son? Because his father's original nature made him so." We shall never get on with this question by begging it. The mere fact of family similarity never need imply the inheritance of parental acquisitions.

A more advanced type of argument adduces the growth of some mental trait in the species as a whole. For instance it is said: "How can the growth of language be explained save by supposing that the constant exercise of the mind in this respect has resulted in ever-increasing facility in offspring until the few shouts and mutterings and wails of primitive man have become the complicated speech of today."

The retort is as easy as before: "Language has grown because on the whole those with the most inborn capacity for it lived and begot their like while those with the least inborn capacity died and left few or no heirs to their linguistic poverty." Not the inheritance of acquisitions, but the selection of those who could acquire!

The field of animal instincts has been well canvassed by

biologists in search of light upon the general question. The gist of their discoveries is: (1) that many instincts are certainly not the result of a summation of acquisitions, *e. g.*, those that appear only once in a lifetime. (2) Most instincts are generalized rather than specific, though most acquired habits are specific rather than generalized. But a specific habit inherited should give a specific instinct. Thus instead of a number of fears of special enemies such as cats, hawks, skunks, etc., chicks have a general alarm at strange and impressive objects. (3) Useless instincts are very slow in being lost unless selection is at work.* Thus chicks swim, though not one in a thousand of their ancestors has done so for thousands of years.

It is remarkable that certain evidence from human psychology has failed to receive attention in all these long debates. Human life offers a favored case for transmission of an acquired trait where transmission has clearly failed. The congenitally blind from eye defects do not have visual images of the sun, stars or any other of the permanent objects of the natural world, yet their ancestors for at least hundreds of generations, save in the cases of those lacking in visual images, had such images again and again. If the hourly experiences of hundreds of ancestral generations do not become a part of inborn equipment, we could hardly expect anything to do so.

The burden of evidence is thus against the transmission of acquired mental traits.† The strengthening of a connection

*If acquisitions became inherited of course unused habits would tend to disappear, would, we might say, be *disinherited*.

†The reasons for denying the power of a change in the body of a parent due to training so to influence the germ cells that the bodies developing therefrom will possess the change apart from training, are especially strong in the case of specific intellectual and moral tendencies. Yet two of the leaders in modern psychology, Wundt and Stanley Hall, assume that the acquired behavior of one generation *does* tend to become the original behavior of the generations to come. The former says, for example: "We have supposed that father can transmit to son the physiological dispositions that he has acquired by practice during his own life, and that in the course of generations, these inherited dispositions are strengthened and definitized by summation" ['92, Eng. transl. of '94,

between a situation and a response by an individual seems unlikely to modify his germs so as to reproduce, in the children developing therefrom, a stronger bond between that situation and that response than they would otherwise have possessed. Similarly for the transmission of an abolition or weakening of a connection. Adequate experiments may conceivably reverse some of the conclusions based on existing evidence, but for the present we must deny the mental acquisitions of one generation any considerable share in the original natures of the next. Original nature springs from original nature. Its improvement depends on the elimination of the worse, not on their reformation. It depends on nothing else, unless there be an inherent tendency in human germs to vary in a definite direction, and that a good one. We educate the original nature of the race only by fostering its good elements and encouraging their fertility, and by debarring the worse elements from reproduction or by eliminating them outright.

THE SELECTION OF 'CHANCE' VARIATIONS IN THE GERM PLASM

The important questions concerning the origin of any instinct or capacity are, as was noted: first, 'What fact in the germs produces it?' and second, 'What fact in nature produced this fact in the germ?' The doctrine that instincts and capacities spring, not from parental learning, but from chance germinal variations, has the merit of calling attention to the first question, but does not answer it. The second question it

p. 408], and "The assumption of the inheritance of acquired dispositions or tendencies is inevitable. [Ibid., p. 405.] The latter does not attempt to explain, or even notice, the difficulties, but takes it for granted that "simian life seems to have almost created the human hand" ['04, vol. 1, p. 155] and that "we inherit the stored results of" the experience of the animals in our ancestral line. ['04, vol. 2, p. 64] His real interest is in being able to assume that the original nature of man summarizes and is due to *all the life of his ancestors,* not in *how* it is due to that life. Neither Wundt or Hall gives any theory of how, or any evidence that, the learning of the past so changes the germs as to become the unlearned tendency of the present.

merely restates after asserting that the answer proposed by the doctrine of the hereditary transmission of learning is false.

It also, perhaps, unfairly emphasizes the difficulty of ascertaining what the subtle forces are that *do* produce the variations in the germ which in time account for the appearance, in the individual, of unlearned tendencies in thought, feeling and action.

These are as yet hidden in the chemistry of protoplasm; but they are no more 'random' or 'accidental' in the strict sense than are the forces whereby hydrogen and oxygen form water or the earth pursues its yearly course around the sun. Nor do believers in the origin of instincts by the selection of accidental variations really think that they are.

The words 'accidental' and 'chance' indeed, in recent selectionist writings, mean little more than that the germinal variations producing trait A as an unlearned tendency of the offspring are not due in any special way to the parental acquisition of trait A as a result of experience. The germinal variations are, the selectionist would readily admit, caused by the environment, including the behavior of the adult body in whose germ plasm the variations are found, and caused in ways that, if we knew them, would be as regular and understandable as any natural causes.

The word 'accidental' has, however, emphasized the mystery of causation unduly. We did not say that the origin of the solar system, or of indigo, or of the contour of the Alps, was due to the selection of accidental variations. Had men done so, their zeal in the search for these origins would probably have been less.

Moreover, the words 'accidental' and 'chance' have left the impression that each original tendency which we separate off in name or otherwise isolate, originated by itself—that we have thousands of independent and enormously unlikely variations to be originated—that amongst dogs that did not 'point' at all one happened to be born that did; that, amongst birds that laid their eggs and departed, one happened to be born with the

extraordinary idiosyncrasy of keeping them warm till they hatched; that amongst birds that paid no attention to their mother when they were babies and no attention to their children when they were mothers, there happened to be born a bird with the one complex peculiarity out of millions of possible ones of letting its mother feed it and of feeding its own babies. The task of 'chance' was thus staggering to the imagination. One had to remain stupefied by the vague hopes of the 'millions of years of geologic time' and the 'billions of experiments which nature makes every year,' and the 'enormously greater variability of germs when the world was young.'

If one tried honestly to figure the probability that the atoms in a fertilized ovum would be thrown into such a condition as to produce such a new variation as incubation out of nothing, he felt like demanding millions of millions of years and billions of billions of experiments! *We need not try.* Original tendencies to behavior are not produced, each independently out of a mere seething of atoms. Each is, as a rule, fathered by some other instinct from which it comes as an easily conceivable 'chance.' The first variations in the animal kingdom give the basis for the next; old variations, by combining in new ways and new proportions or by minor alterations in intensity alone, account for many new ones.

Just as the four-chambered heart of mammals came as a chance, not from chaos, but from a three-chambered heart, so the original fears, loves and fighting-tactics of man lead back to aversions, attractions and warfare existing long before man. Behavior, as well as gross bodily structure, has its genealogical tree—its natural history. The origin of variations is directed in both cases *by the variations that have already occurred.* The task of the environment in producing, in the germ cells of multicellular animals, changes such as have produced all the changes in original tendencies to behavior from, say, the flatworms to man, is still great enough—but it is a million-fold less than it seems to one who thinks of each instinct of each species as a thing by itself. The worst difficulty of the origin

of instincts by the direct action of the environment upon the germs was an imaginary difficulty.

THE CONTINUITY OF ORIGINAL TENDENCIES

To illustrate the continuity of instincts and their origin by combinations of previous tendencies or by modifications thereof in a single particular, I quote the admirable account of incubation given by the late Professor C. O. Whitman.

1. *Meaning to be Sought in Phyletic Roots.*—It seems quite natural to think of incubation merely as a means of providing the heat needed for the development of the egg, and to assume that the need was felt before the means was found to meet it. Birds and eggs are thus presupposed, and as the birds could not have foreseen the need, they could not have hit upon the means except by accident. Then, what an infinite amount of chancing must have followed before the first "cuddling" became a habit, and the habit a perfect instinct! We are driven to such preposterous extremities as the result of taking a purely casual feature to start with. Incubation supplies the needed heat, but that is an incidental utility that has nothing to do with the nature and origin of the instinct. It enables us to see how natural selection has added some minor adjustments, but explains nothing more. For the real meaning of the instinct we must look to its phyletic roots.

If we go back to animals standing near the remote ancestors of birds, to the amphibia and fishes, we find the same instinct stripped of its later disguises. Here one or both parents simply remain over or near the eggs and keep a watchful guard against enemies. Sometimes the movements of the parent serve to keep the eggs supplied with fresh water, but aëration is not the purpose for which the instinct exists.

2. *Means Rest and Incidental Protection to Offspring.*—The instinct is a part of the reproductive cycle of activities, and always holds the same relation in all forms that exhibit it, whether high or low. It follows the production of eggs, or young, and means primarily, as I believe, rest with incidental protection to offspring. That meaning is always manifest, no less in worms, molluscs, crustacea, spiders and insects, than in fishes, amphibia, reptiles and birds. The instinct makes no

distinction between eggs and young, and that is true all along the line up to birds which extend the same blind instinct to one as to the other.

3. *Essential Elements of the Instinct.*—Every essential element in the instinct of incubation was present long before the birds and eggs arrived. These elements are: (1) the disposition to remain with or over the eggs; (2) the disposition to resist and drive away enemies; and (3) periodicity. The birds brought all these elements along in their congenital equipment, and added a few minor adaptations, such as cutting the period of incubation to the need of normal development, and thus avoiding indefinite waste of time in case of sterile or abortive eggs.

(1) *Disposition to Remain over the Eggs.*—The disposition to remain over the eggs is certainly very old, and is probably bound up with the physiological necessity for rest after a series of activities tending to exhaust the whole system. If this suggestion seems far-fetched, when thinking of birds, it will seem less so as we go back to simpler conditions, as we find them among some of the lower invertebrate forms, which are relatively very inactive and predisposed to remain quiet until impelled by hunger to move. Here we find animals remaining over their eggs, and thus shielding them from harm, from sheer inability or indisposition to move. That is the case with certain molluscs (*Crepidula*), the habits and development of which have been recently studied by Professor Conklin. Here full protection to offspring is afforded without any exertion on the part of the parent, in a strictly passive way that excludes even any instinctive care. In *Clepsine* there is a manifest unwillingness to leave the eggs, showing that the disposition to remain over them is instinctive. If we start with forms of similar sedentary mode of life, it is easy to see that remaining over the eggs would be the most likely thing to happen, even if no instinctive regard for them existed. The protection afforded would, however, be quite sufficient to insure the development of the instinct, natural selection favoring those individuals which kept their position unchanged long enough for the eggs to hatch." ['99, pp. 322 ff.]

The proper continuation of this topic would be a series of genealogies or evolutions of other different features of man's original nature. But the natural history of the development

of any one of these, from its condition in the early generalized primate whence man sprang to its condition in man today, is as yet unknown.

Marshall gives (in his *Instinct and Reason* ['98], especially in chapters IV to VIII) an acute and interesting speculative general genealogy of instincts, showing how, in his opinion, the instincts concerned in the life of the individual grew into more complete forms as organisms consisting of larger and more variegated aggregates of cells developed, how the instincts of the life of sex and the family could grow from these by variation, complication and addition, how the instincts concerned in the life of larger social groups should come later, and how a final instinct to regulate and harmonize all these appeared in the shape of man's tendency to be religious. Many other writers have, in the case of one or other feature of human nature, suggested possible origins, but these too, though often interesting, are speculative. Indeed, we do not know what was the physical form of the early primate whence man sprang, much less what were his original tendencies to thought, feeling and conduct, and least of all how these grew into the human activities of our list.

To recognize the fact of our ignorance is itself instructive. So I illustrate it in the case of the question of how far man's original nature has advanced intellectually and morally in the course of the last ten thousand generations.

THE EXTENT OF SELECTION FOR INTELLECTUAL AND MORAL SUPERIORITY

The reader who has absorbed without criticism, as truisms of evolution, a multitude of doctrines to the effect that from primitive man a quarter or half million years ago to man today there has been a wonderful increase in the intellectual capacities and moral instincts, will be shocked to hear that it is well within the bounds of belief that man's original nature is little or no better adapted to the conquest of nature or to peace and good

will amongst men now than then. That it is within the bounds of belief is proved by the simple fact that competent thinkers believe it. In the most recent and most searching survey of racial progress, Boas expresses gravest doubt concerning the supposed gains in original intellect and morality of modern over primitive man. He says in summary:

"Before we entered into the comparison of the mental life of primitive man and of civilized man, we had to clear away a number of misconceptions caused by the current descriptions of the life of primitive man. We saw that the oft-repeated claim that he has no power to inhibit impulses, no power of attention, no originality of thought, no power of reasoning, could not be maintained; and that all these faculties are common to primitive man and to civilized man. . . . This led us to a brief consideration of the question whether the hereditary mental faculty was improved by civilization, an opinion that did not seem plausible to us." ['11, p. 247.]

It is a question of the origin of inheritable variations and of their selection. What inheritable variations toward greater intellectual capacities, readier kindliness, and the like there have been since paleolithic man, no one knows. Nor do we know so much as we are tempted to think we do about the selection that has taken place amongst the varieties of human nature then existing or since evolved. It is easy to build up plausible hypotheses about who have been killed off but almost as easy to undermine them.

As a sample of such hypotheses we may examine the following from Sutherland, who is one of the most candid and definite and concrete of the moralists who see a cause of man's present decency, and a promise of general justice and affection for the future, in the improvement of man's original nature by the elimination of the cruel, stupid and perverse individuals of the species.

"It may seem fantastic to assert that within historic times actual physiological differences of nerve structure can have been developed in the race. Yet it is a sober fact, though demonstrable as yet by only indirect proofs. For we have seen that

the man who is a good father, a good husband and a good citizen is the ancestor of many progeny, while the Napoleonic type of abundant brains but deficient sympathies, even though it makes a brilliant career, perishes in a century or less from off the face of the earth. Let us form some idea of the rate at which this process may go forward. Each person now living had two parents, four grandparents, eight great-grandparents, and so on; thus ten generations back his ancestors formed a living regiment of 1024 persons. If there has been any intermarrying of relatives in the interval the number, of course, must be reduced. Make a small allowance, and assume that on an average each Englishman of the present day had 1000 ancestors of the tenth degree all living in the time of Queen Elizabeth. Or rather let us assume that there were then born 500 boys and 500 girls who might have been the ancestors of the now living individual, but that a portion of these were weeded out; some of them dying through want of sufficient parental care; others as they grew up dying through their own failure of sympathetic quality. One might have turned out a murderer and been hanged, another a robber and been shipped to the plantations. One might have been killed by his own youthful immoralities, another refused a wife because of his disorderly life. In short, it is no exaggeration to say that out of 1000 possible ancestors, fifty would, on an average, be eliminated through the failure of parental, conjugal or social qualities. Indeed, in Elizabeth's time, out of every 1000 persons born five were actually hanged, as a matter of recorded statistics. But brawls, venereal diseases, and so forth were far more potent cleansers of society. Those thus eliminated would be replaced by men and women of better stock, and so we may feel sure that at each generation a steady 5 per cent. of the poorer type was withdrawn, leaving room for the expansion of those richer in sympathetic qualities. But the power of such a steady withdrawal, acting in cumulative fashion, is enormous when spread over a sufficient time; even 300 years are quite enough to produce visible effects; indeed, if we had a means of sifting the people of Queen Elizabeth's time into two equal sets, those who could pass in those days for fairly good men and women, and those who were more or less distinctly below the average of moral conduct, it would be found that practically none of the inferior blood flows in the

veins of the present generation; we being bred almost wholly from the better stock.

All this implies that nerve organisms of finer susceptibilities survive, and it follows, therefore, that we are of distinctly different nerve reactions from those ancestors of ours who, 1500 years ago, regarded the Leges Barbarorum as suitable codes of justice. And the change becomes very rapid in such a land as the England of the last three centuries, with its internal development so little troubled by war, and its external conflicts serving only as a vent for restless spirits away from home. Within the community the preservative value of courage and strength has been declining while that of intelligence and sympathy has been ever on the increase. In no other way can we account for that enormous acceleration in the growth of sympathy during these later times, so abundantly shown in the chapters which have, or were to have, preceded." ['98, vol. 2, p. 5 f.]

The difficulty with such arguments is, of course, the abundance of apparently contrary cases. Were the brutal husbands hanged, or did they drive their long-suffering wives to early graves? Were the cut-throats and brawlers or the reformers and idealists debarred, by death, disgrace or imprisonment, from having offspring? Many patient researches must be made before anybody can be sure of the relation of selection for survival and reproduction to any of the important original tendencies in man, for even ten generations back. What it has been on the whole during the ten thousand or more generations of men since man worked flints, we may never know. Even if man's original nature had steadily deteriorated, the gains from training—from the circumstances in which, and the tools with which, man lives and works—would probably have always masked the fact to ordinary observation. No one can doubt that by far the greater part of human advance is due to changed conditions rather than changed natures. Perhaps it all is.

Such are the perplexities of one who tries to account for man's present status in sympathy, curiosity, abstract reasoning and the like. A generation ago, men of science began to suspect that each generation's habits did not directly transfer themselves into an instinctive fund. A decade ago, they began

to supplement the vague general fact of germinal variation and selection through survival, by experimental studies of the actual units of variation, the mechanism of inheritance and the nature and extent of selection by survival. It is to be hoped that, a decade hence, some psychologist will have shown by such scientific genealogies as the biologists are now developing, what sorts of inheritable mental variations are being originated and what varieties of mankind have been, and are being, selected for survival and the production of offspring. The source of man's original nature in the future should be, within the limitations set by ultimate biological laws, in the power of man himself. In proportion as he realizes that no question is more important for him than the question of who is being born, he can learn to give the original nature of future men a higher, purer source than the muddy stream of the past.

CHAPTER XVI

The Order and Dates of Appearance and Disappearance of Original Tendencies

Different original tendencies appear at different dates after the fertilization of the ovum—the beginning of a new individual life. Some are delayed only until birth; some, till long after birth. The order of appearance and the length of the intervals from the start of life to the appearance of each tendency are not random. Typical conditions exist for man as a species, with, of course, very wide variations. For this typical order and these typical intervals there must be a reason.

Original tendencies also may persist for different lengths of time after their first appearance. The influence of the discomfort produced by them is often the only explanation needed for this transitoriness and its degree. But in some cases the original tendency seems to be *inherently* transitory, to disappear from the organism's repertory even though its exercise produces no discomfort to the individual. For these wanings and their dates also there must be a reason.

Two theories have been suggested to account for the order and the dates of appearance and disappearance of original tendencies. The first is the *Recapitulation Theory.* The second is the *Utility Theory.*

THE RECAPITULATION THEORY

The Recapitulation Theory in its clearest form is that the order of appearance of original tendencies in the individual is more or less exactly that in which they have appeared in the race—that is, in the entire ancestry of the individual,—and that the intervals from the fertilization of the ovum to the

dates of appearance of the individual's original tendencies bear more or less exactly the same proportions one to another that the intervals from the beginning of life in the animal kingdom to the dates of appearance of the same tendencies in the race bear one to another. The order and dates of disappearance in the individual parallel in a similar manner the corresponding facts in man's ancestry. The reason assigned for this parallelism between an individual and his entire ancestry in the order and dates of appearance and disappearance of original tendencies by the recapitulation theory is the supposed bionomic law. This is a law of the germ's development whereby any change made in it is made with an additional mechanism that sets the date of the change's effect on the individual developing from that germ later than the dates of the effects of changes made hitherto in the germ. Suppose, for example, that for a thousand centuries from the origin of life, man's ancestors floated aimlessly, then for a thousand swam by cilia, then for a thousand wriggled like snakes, then for a thousand walked on four feet, then for a thousand both walked, climbed and swung as do the monkeys. Let us suppose further that each new tendency was accompanied by the loss of the old one. Then, by this extreme form of the recapitulation theory, the human individual should, beginning at the start of his individual life, possess these tendencies in that same order, retain each for an equal time, and lose them one after another (except of course the last, whose loss would depend upon whether the individual's ancestry had lost it).

A more general illustration in graphic form will help to fix this extreme form of the Recapitulation Theory in memory. Suppose tendencies A, B, C, D, etc., to have appeared in man's ancestry at the times shown by the upper ends of the lines at the left hand of Fig. 22 and to have been lost at the times shown by the lower ends of these lines. Then tendencies A, B, C, D, etc., will appear in man's life and, apart from outside influence, will disappear therefrom, as shown by the lines at the right of Fig. 22.

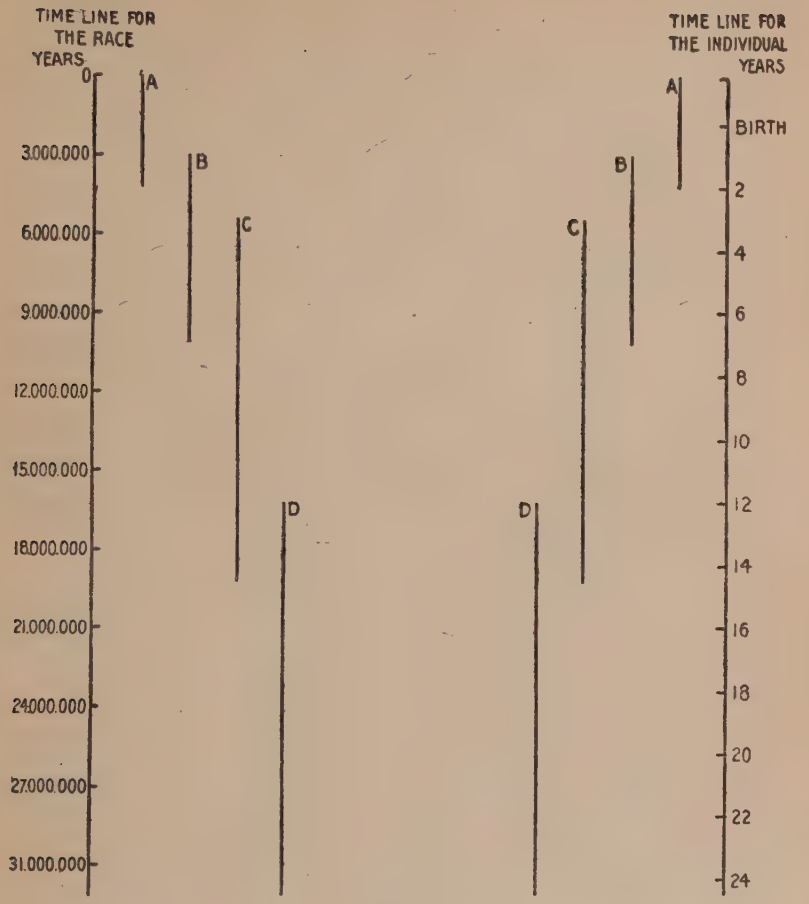


FIG. 22.

This clear extreme form of the recapitulation theory is probably held by no student of human nature; for, obviously, the time during which the early ancestral tendencies are possessed by the individual is, if not zero, at least a far smaller fraction of the time during which the late ancestral tendencies are possessed by him than is the case with the times in the case of the race. So the parallelism of individual and race is universally amended by supposing the early racial tendencies

to be in the individual abbreviated in some rough proportion to their earliness.

Instead of Fig. 22, then, we would have something like Fig. 23, wherein A's stay in the individual is one-tenth as long a fraction of the period from conception to the adult condition, as A's stay in the individual is of the period from the protozoa to modern man; B's stay is two-tenths; C's is four-tenths and D's is seven-tenths.

To make sure that the reader gets a just idea of what the

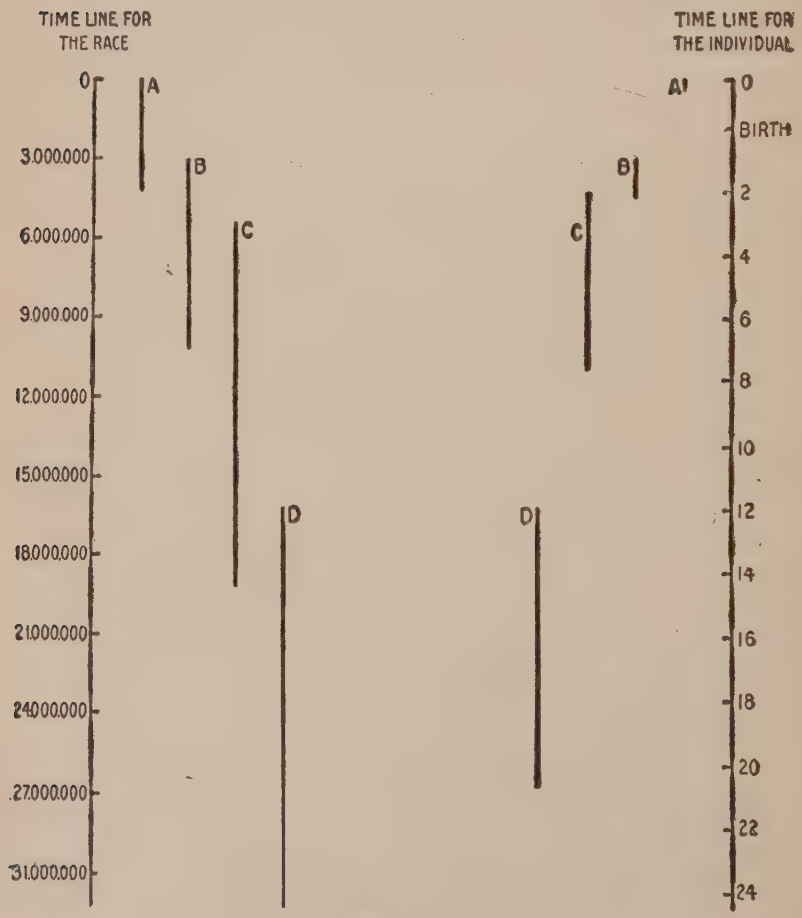


FIG. 23.

recapitulation-theory means to its adherents and of how they use it in explaining human nature, I quote at some length from their most instructive statements about it. The following are samples of the more general statements:

"The course of mental development is exactly determined through the relation of ontogenesis (individual development) to phylogenesis (the development of the race). The development of the higher (purposive and rational) activities is regulated in every respect in accord with the previously developed instincts, and is primarily conditioned by them. No influence that works in opposition to this development and to the law of inheritance of racial traits in order can ever reach a suitable adaptation, but only disturbs the natural course of development, and creates abnormal misdirected endeavor." [Schneider, '82, p. 489]

"The individual, from conception to senescence, follows the order of development of the race." [Burk, F. L., '98, p. 36]

"As in the physical world, so in the psychical there is a natural order of growth. Since it is the order of nature that the new organism should pass through certain developmental stages, it behooves us to study nature's plan and seek rather to aid than to thwart it. For nature must be right; there is no higher criterion. There is, therefore, no study of more vital importance to the educationist than this of the natural development of organisms. The parallelism of phylogeny and ontogeny enforces the argument in favor of natural development and the doctrine of katharsis or vaccination as applied to the moral growth of the child. It furnishes a double support to the view that education should be a process of orderly and gradual unfolding, without precocity and without interference, from lower to ever higher stages; that forcing is unnatural and that the mental pabulum should be suited to the stage of development reached. So long as we keep the end in view and do not cause the child to linger in any of the stages, we need not fear the discipline that each stage is calculated to give as a preparation for the next. For what Von Baer long ago said of animals is true also of the child: 'The type of each animal appears to fix itself at the very beginning in the embryo and to dominate the whole development.'

"The period of animal recapitulation is short. In this

work the attempt has not been made to deal with the recapitulation of human stages of development, but reasoning from the fact that the length of time taken to recapitulate a period does not depend upon the duration of that period phylogenetically, but upon its recency, we may conclude that the recapitulation of human stages of development is much longer than that of the longest animal stage, viz., the ape stage." [Guillet, '00, pp. 427-428]

"Holding that the child and the race are each keys to the other, I have constantly suggested phyletic explanations . . " [Hall, G. S., '04, vol. 1, p. viii]

. . . "the child ontogenetically recapitulating the phylogenetic development of the race, craves instinctively for communion with nature." [Bolton, F. E., '99, p. 227]

. . . "ontogenetic development is recapitulatory. Each individual passes through the stages through which its phylum has passed." [Dawson, G. E., '00, p. 189]

. . . "the child's development is only a condensed index of what took place on the larger plane of race history." [Slaughter, J. W., '02, p. 294]

The following, all from Stanley Hall, are samples of the theory as it works in use:

"Our animal ancestors were not birds, and we cannot inherit sensations of flying; but they floated and swam far longer than they have had legs, had a radically different mode of breathing, and why may there not be vestigial traces of this in the soul, as there are gill-slits under the skin of our necks; and why may not the former come to as great prominence in exceptional stages and persons as the latter do in some monstrous births? To deny it is to make the soul more limited in its backward range than is the body. For one, I am too realistic and cannot think so meanly of the soul as to do this. Although it cannot be demonstrated like rudimentary organs, I feel strongly that we have before us here some of the oldest elements of psychic life, some faint reminiscent atavistic echo from the primeval sea." ['97, p. 158]

"These non-volitional movements of earliest infancy and of later childhood (such as 'licking things, clicking with the tongue, grinding the teeth, biting the nails, shrugging corrugations, pulling buttons or twisting garments, strings, etc.,

twirling pencils,' etc. etc.) . . . are relics of past forms of utilities now essentially obsolete. Ancient modes of locomotion, prehension, balancing, defense, attack, sensuality, etc., are all rehearsed, some quite fully and some only by the faintest mimetic suggestion, flitting spasmodic tensions, gestures, or facial expressions." ['04, Vol. 1, p. 160]

"The best index and guide to the stated activities of adults in past ages is found in the instinctive, untaught, and non-imitative plays of children. . . . In play every mood and movement is instinct with heredity. Thus we rehearse the activities of our ancestors, back we know not how far, and repeat their life work in summative and adumbrated ways. It is reminiscent, albeit unconsciously, of our line of descent, and each is the key to the other. . . . Thus stage by stage we enact their (our ancestors') lives. Once in the phylon many of these activities were elaborated in the life and death struggle for existence. Now the elements and combinations oldest in the muscle history of the race are re-presented earliest in the individual, and those later follow in order." ['04, Vol. 1, pp. 202-203]

"Very interesting scientifically and suggestive practically is another correspondence . . . between the mode of spontaneous activity in youth and that of labor in the early history of the race . . . during this early time great exertion, sometimes to the point of utter exhaustion and collapse, alternated with seasons of almost vegetative existence. We see abundant traces of this psychosis in the muscle-habits of adolescents." ['04, Vol. 1, p. 215 f.]

"Normal adolescent boys especially wish to explore night out-of-doors, to rove about perhaps with adventurous or romantic thoughts, and on moonlight nights particularly there is a pathos about the necessity of rest. A part of this suggests an atavistic recrudescence of what may have been in primitive man the need of watchfulness, the custom of predatory adventures by night, still reverberating in the attenuated form of periods of nocturnal restlessness." ['04, Vol. 1, p. 264]

"As in the pre-natal and infant stage man hears from his remoter forebears back perhaps to primitive organisms, now (at adolescence) the later and higher ancestry takes up the burden of the song of life, and the voices of our extinct and perhaps forgotten, and our later and more human ancestry, are heard in the soul." ['04, Vol. 2, p. 70 f.]

. . . "the interesting phenomenon of 'candle-light fever.' Children wake up as to a new morn *in petto,* are wild, noisy, frolicsome, and abandoned. This, I suggest, may be the reverberation in modern souls of the joy that in some prehistoric times hailed the Prometheus art of controlling fire and defying night." ['04, Vol. 2, p. 173]

"The years from about eight to twelve constitute an unique period of human life. The acute stage of teething is passing, the brain has acquired nearly its adult size and weight, health is almost at its best, activity is greater and more varied than ever before or than it ever will be again, and there is peculiar endurance, vitality, and resistance to fatigue. The child develops a life of its own outside the home circle, and its natural interests are never so independent of adult influence. Perception is very acute, and there is great immunity to exposure, danger, accident, as well as to temptation. Reason, true morality, religion, sympathy, love, and esthetic enjoyment are but very slightly developed. Everything, in short, suggests the culmination of one stage of life as if it thus represented what was once and for a very protracted and relatively stationary period, the age of maturity in some remote, perhaps pigmoid stage of human evolution, when in a warm climate the young of our species once shifted for themselves independently of further parental aid." ['04, Vol. 1, pp. ix and x]

"Adolescence is a new birth, for the higher and more completely human traits are now born. . . . The child comes from and harks back to a remote past. ['04, Vol. 1, p. xiii]*

THE UTILITY THEORY

The Utility Theory explains the dates of original tendencies by the same causes as account for their existence—*variation* and *selection.* Other things being equal, the date at which a tendency appears is that one of the many varying dates at which it has appeared in our ancestry which has been most serviceable in keeping the stock alive. Thus suckling,

* Abundant further illustrations may be found in Stanley Hall's *Adolescence*—e.g., in vol. 1, on pages 160, 206, 216, 223, 264, 353, 356, 358, 361, 366; and, in vol. 2, on pages 181 f., 192, 194 f., 212 f., 215, 216, 217, 219, 365.

though late in the race, is early in the individual. The sex instincts, though early in the race, are very late in the individual. Walking on all fours, though the possession of the race for perhaps millions of years, is evanescent or non-existent as a human instinct; creeping, though not a duplicate of any important form of locomotion possessed and then lost in our ancestral line, is one of the most emphatic transitory tendencies of infancy.

An advocate of the Utility Theory should not assert that the actual order is in every particular useful (that is, more useful that a chance order); much less that it is the most useful order for survival that there could be. An order of original tendencies has to be very injurious if the individual possessing it is to be very frequently eliminated. For a better order than whatever order exists to be selected for survival, it must first appear as a variation. That is, the theory that the order and dates of appearance and disappearance of original tendencies are due to natural selection is subject to the same interpretation as the theory of natural selection elsewhere.

I have not found instructive quotations representing the utility theory. It has been, perhaps, assumed by opponents of the recapitulation theory, but they have generally been satisfied to point out the latter's impossibilities, without advancing a constructive doctrine. As held by the writer, the utility theory of the order of appearance and dates of the original tendencies in human intellect and character is *that the same causes which account for the origin and perpetuation of a tendency account for its time relations to other tendencies. Whatever makes the tendency happen at all makes it happen at some date and place in the total order of the animal's development. Whatever makes it vary at all makes it vary in its date. Other things being equal, the date which will be perpetuated will be that one of the many varying dates at which it appears, which proves most serviceable in keeping the species alive. Similarly for its date of disappearance.* What the time relations of human original tendencies are, like what the tenden-

cies themselves are, is thus the result of *variation by whatever influences the germplasm* and *selection by utility.*

THE EVIDENCE

Advocates of the recapitulation theory rely upon the analogy between the development of the mind and that of the body, and the assumption that in the latter the order of change from the fertilized ovum to the adult structure is the order of change in the race from the protozoa to *homo sapiens.* 'Since ontogeny repeats phylogeny in the growth of the body, it probably does in the growth of behavior,' is the one repeated argument.

The facts are, however, that the only valid analogy would be between the development of the mind and that of the central nervous system, that the latter does not develop in man in anything at all closely like the way in which it has developed in the total ancestry of man, and that in the body as a whole the duplication of phylogeny by ontogeny is by no means a general law of growth. These three points will best be discussed in the reverse order.

The recapitulatory, or bio-genetic, or bionomic, law that 'ontogeny repeats phylogeny' is true in only a very vague and partial way. Only in rough outlines and in the case of a fraction of bodily organs does nature make an individual from the fertilized ovum by the same series of changes by which it made his species from the primitive protozoa. No competent biologist would, for instance, dare to infer, from the series of stages through which the lungs, arms and legs, and cerebral hemispheres pass in individual development, what the exact origins of lungs, arms and fore-brain were in the race. The likenesses of a man at successive periods to the adult forms of a fish, reptile and early mammal are faint and questionable. No one would mistake the human embryo at any stage for any adult fish or reptile or mammal. No one can tell from ontogeny what the phylogeny of man has been in the great

changes from invertebrate to vertebrate, from early generalized mammal to primate, from early primate to man. The clearest cases of recapitulation are those where the way taken to produce the structure is a likely way apart from any tendency to recapitulate for recapitulation's sake. Thus, for a four-chambered heart to be made by making one chamber, dividing it, and then dividing each of the halves; for a backbone to be deposited in a mould of cartilage; for a multicellular animal to grow by cell division, or for the total structure of an animal to be first laid down in a series of segments, might be efficient ways irrespective of ancestry. We must not forget that the animal has to grow *somehow*.

The facts of ontogeny and of phylogeny in the case of the central nervous system are notably discouraging to the expectation that the dates of original tendencies in intellect and character from birth to manhood can be prophesied from the history of the race. Man's brain in general follows in its growth a course enormously unlike that by which it developed in the race. His backbone and heart may at one stage be much like that of a reptile, but his brain is not. His head may show traces of gill slits, but his brain never develops the lateral-line system of the fishes. The fusion of tail vertebrae may be followed in his coccyx, but the fusion of segments in the brain is almost or quite untraceable. Moreover, by the time a baby is born, his brain has long, long outgrown any forms comparable to those of fish, amphibion, reptile or early mammal. So also in the number of its neurones. The growth of the neurones' connections has not been traced, but this seems least of all likely to repeat racial history. Oddly enough the chief variation of the brain's growth from that of the body as a whole is a most unlikely variation to come on the recapitulatory hypothesis: his brain is specially *big* for his body, the new-born being in this respect the super-man!

Now for any valid expectation that a child should have at a certain age original tendencies to thought or action such as are characteristic of a fish or monkey or primitive

man, one should have reason to expect the parts of his brain concerned to be at that age like the corresponding parts of the brain of the primitive man or the monkey or the fish. Such reasons are lacking.

The argument from analogy with bodily development thus fails to justify the hypothesis that the order and dates of human original tendencies will correspond with their order of acquisition and length of maintenance in man's total ancestry. The question should be settled, not by overstraining an analogy, but by actually comparing the individual and the racial course of development.

Neither series is well enough known to allow more than occasional and inadequate comparisons; but what little is known is rather decidedly against any close parallelism of the two. For example, reaching for objects, holding them, putting them in the mouth, sitting up, standing erect, walking, climbing, hunting, migration, fighting and the sex instincts, whose dates of appearance in individual development are fairly well known, come in nothing like the order and at nothing like the dates of racial development.

Even the cases suggested as examples of the parallelism by advocates of the theory often are strong evidence against it. For example, Stanley Hall states as possible parallels, in the individual, of the fish stage in the race, the following:

"A babe a few days old . . . made peculiar paddling or swimming movements."

"In children and adults . . . we find swaying from side to side or forward or backward, not infrequent. This suggests the slow oscillatory movements used by fish."

"Children . . . after the first shock and fright take the greatest delight in water."

"Others older or less active can sit by the hour seeing and hearing the movement of water in sea or stream." ['04, vol. 2, pp. 192-195, *passim*]

The fish stage is thus paralleled all the way from four days to forty years, even if we doubt the existence in fishes of any-

thing like the elderly contemplation of water by one sitting on the bank.

The life of the early primates according to Hall ['04, vol. 2, p. 214 ff.] is recapitulated by the prehensile power of the new-born, the fear of thunder and lightning, the fear of serpents, the fear of high winds, the somnolence of infants when rocked, the fear of open places, the "untaught horror of water" and the fact that man does not instinctively swim, the fear of falling, the clinging of infants to the parent, the love of climbing in boys, and the fact that 'man has an instinctive pleasure to get up high and look down and afar, "imitativeness, the facts that children instinctively and without teaching ascribe "emotion, sense, intelligence, morality, to trees" and that "dense forests soothe, hush, and awe the soul and feel 'like church.' "

Roughly the individual would seem to pass through the primate stage somewhat earlier than the fish stage, especially since we can confidently acquit our monkey ancestors of any tendency to ascribe "intelligence and morality to trees" or to feel "like church." But within a single page Hall has the childish interest in trees recapitulating, not the life of the primates, but that of the primitive man! The same author makes the early teens recapitulate "the darkest of all ages during which brute became man," the times of astrology and ancient myths of stars, and the times of "pastoral and agricultural life" as well as the times of the fishes and apes. The new-born baby not only "makes paddling and swimming movements" *qua* fish, but also has a "horror of water" *qua* monkey. Such defenses of the recapitulation theory are obviously more dangerous to it that the most violent attacks.

Certain obvious exceptions—such as the very late appearance in the individual of the instincts of sex which arose very early in the race, or the very early appearance in the individual of babbling, laughing, weeping, grasping and putting in the mouth—have forced the adherents of the recapitulation theory to admit that, in the individual, the racial order is much dis-

torted, and that some of its elements are omitted altogether, or passed through so rapidly as to be hardly discernible. When it is admitted that such distortions and omissions are very frequent, little more is left of the theory than a useless general scheme for explaining facts whose existence has to be proved by direct observation entirely apart from the theory, or a body of dubious suggestions for investigation. A rule for the exceptions becomes more instructive than the rule itself.

On the whole, the recapitulation theory in the case of mental traits seems to be an attractive speculation with no more truth behind it than the fact that when a repetition of phylogeny, abbreviated and modified, is a useful way of producing an individual, he may be produced in that way. In intellectual capacities the child of two years has passed all the stages previous to man. It is difficult to find even one instinct in ten that occupies in his ontogeny the same relative position in time that it occupied in his phylogeny. No fact of value about either the ontogeny or phylogeny of behavior has, to my knowledge, been discovered as a result of this theory. Consequently one cannot help thinking that the influence which it has exerted upon students of human nature is due, not to rational claims, but to its rhetorical attractiveness. The general idea was entertained before the days of Von Baer and Darwin, and its educational parallel, the culture-epoch theory, has, despite absence of rational grounds, been exceedingly popular.

The evidence for and against the utility theory may be summarized more briefly. If the clearest cases of delayed tendencies are examined, their dates of appearance do seem, within such limitations as hold of all functions, to be more useful to the species than much earlier dates would be. Thus, supposing in each case that the rest of man's organization remained as it is, a tendency to try to walk at six months, or to climb trees at two years, or to sex-indulgence at eight,

and the like, would probably be injurious. If clear cases of transitoriness are examined, their dates of disappearance seem also roughly more economical than much earlier or later dates would be. Thus, apart from civilization's aids, the species would probably suffer if, while the rest of man's organization remained as it was, children lost the tendency to suckle at the age of six months or retained the tendency to cling to a familiar human animal till the age of sixty years.

Divergences from the racial order and dates are very often in the direction of a more useful order. So sitting up baby-wise with legs outstretched in front comes in the early months of man's life (though very late, or not at all, in the race), preceding the full development of reaching, grasping and putting in the mouth. So walking erect precedes climbing trees. So there is a mutual adaptation of the dates of the baby's behavior and the mother's and father's at the age of zero for the former, and at fourteen or later in the latter, though presumably in the race these correlatives developed at the same time.

On the whole, although too little is as yet known of the dates of appearance and disappearance of human original tendencies to verify any theory, natural selection of *a certain date* for a tendency seems to have the same claim that natural selection of the tendency itself has.

THE DATES OF APPEARANCE OF PARTICULAR TENDENCIES

Since an original tendency may appear only after a certain stage of growth is reached, may increase in strength or vary in nature as growth progresses and may, apart from all effects of experience, wane and disappear, such a tendency is adequately described only by describing its status at every stage of growth. The inventory of our earlier chapters, to be complete, would have to include the changes in each original tendency in relation to the animal's growth or total life-history. In a later volume I hope to remedy this incomplete-

ness, but for the present, the assignment of each detailed tendency to a period in the individual's life and the estimate of its rate of rise (and of its fall, if it is transitory) will be left to the reader's own judgment or further studies.

No very sharp details should be expected from such studies. The complex interaction of growth from within and training from without is so baffling that the studies that have been made of the time-relations of instincts are inconclusive even when the methods of getting and treating the facts have been sound. When, as has often been the case, the collection of data has been misguided and their treatment uncritical, the results are likely to be less accurate than a sagacious man's guess. Consequently, the literature in this field, though in many cases interesting as a concrete presentation of child life, does not enable one to separate the unlearned from the learned year by year.

Two general questions concerning the time-relations of original tendencies may be discussed here because of their intrinsic importance and their service in predisposing the student to a critical attitude in connection with the general literature of mental development in childhood. These questions concern the *suddenness of the waxing of delayed tendencies* and the *frequency of transitory tendencies.*

THE GRADUAL WAXING OF DELAYED INSTINCTS AND CAPACITIES

It is a favorite dictum of superficial psychology and pedagogy that instincts lie entirely dormant and then spring into full strength within a few weeks. At a certain stage, we are told, such and such a tendency has its 'nascent period' or ripening time. Three is the age for fear, six is the age for climbing, fifteen is the age for cooperativeness, and the like. The same doctrine is applied to the supposed 'faculties' or very general capacities of the mind. Within a year or two around eight the child is said to change from a mere bundle of sensory capacities, to a child possessed of imagination; somewhere

around thirteen another brief score of months brings his reasoning up from near zero to nearly full energy; a year or two somewhere in the 'teens creates altruism!

These statements are almost certainly misleading. The one instinct whose appearance seems most like a dramatic rushing upon life's stage—the sex instinct—is found upon careful study to be gradually maturing for years. The capacity for reasoning shows no signs by any tests as yet given

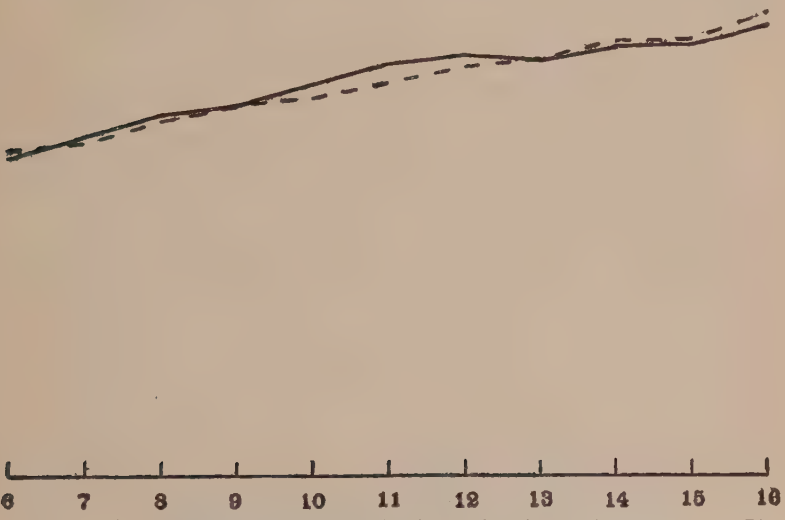


FIG. 24. The average rate of tapping for boys of each age from 6 to 16. The continuous line represents Gilbert's estimate; the dash line represents Bryan's estimate (for the left-wrist-movement).

of developing twice as much in any one year from five to twenty-five as in any other. In the cases where the differences between children of different ages may be taken roughly to measure the rate of inner growth of capacities, what data we have show nothing to justify the doctrine of sudden ripening in a serial order. Thus the results in the case of the rate of tapping (as on a telegraph key) for boys are shown in Figure 24. The dash line represents the average ability year by year from six to sixteen as determined by Bryan ['92]*

* For one of eight movements used by him, the 'Left Wrist.'

and the continuous line that determined by Gilbert ['94]. Figure 25 shows the average of the two curves. These curves suggest fluctuations, notably a failure of the thirteen-year-olds to surpass the twelve-year-olds, a notable superiority of the sixteen-year-olds over the fifteen-year-olds, and a greater gain from six to eleven than thereafter, but the development

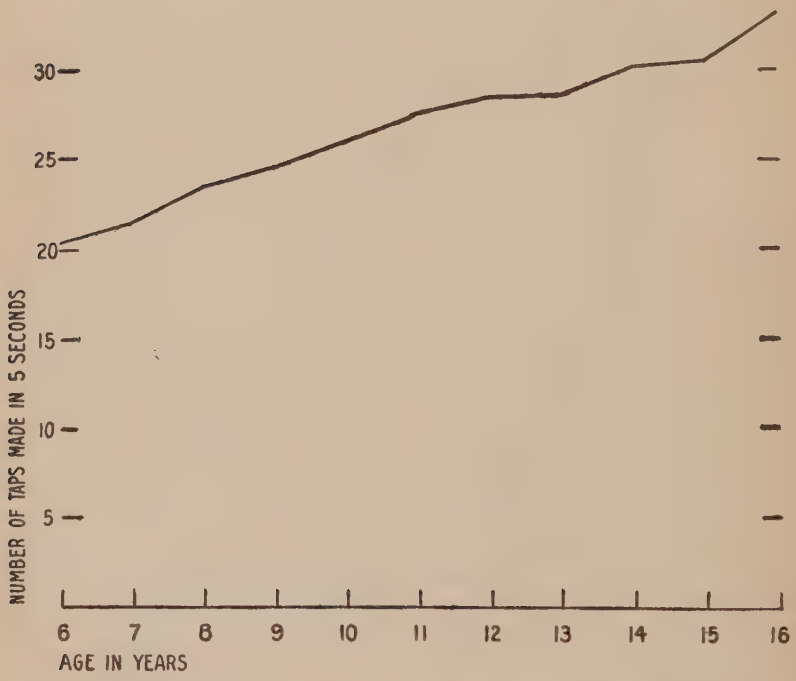


FIG. 25. The average of the two curves shown in FIG. 24.

of the capacity is, as a whole, gradual. At least, that word would seem to most observers to fit the progress measured by Figures 24 and 25.

The few interests whose strength, period by period, have been more or less well measured, give no evidence of any sudden accession to power. Thus collecting * seems to increase

* According to C. F. Burk ['00] twelve hundred boys and girls reported to their teachers the names of the objects which they were at the time

in vigor gradually from before six to ten. The capacities of sensory discrimination, memory, observation and the like which have been measured in children at different ages, are of course in the conditions that they are at any age because of training as well as inner growth, and the facts concerning their rates of gain cannot be used at their face value in our argument. But so far as they do go, they give no support to the theory of the sudden rise of inner tendencies. Indeed every tendency that has been subjected to anything like rigid scrutiny seems to fit the word gradual rather than the word sudden in the rate of its maturing.

In the case of the lower animals, where control of training and accurate measurement of the animal's performance is feasible, gradualness of development is found the rule for delayed instincts. Thus the author ['99] found that a dozen days or so were required from the first beginnings to the full development of fear of large moving objects in chicks, that the fighting of roosters shows its first feeble beginnings as early as the sixth day of the chick's life, that the balancing reaction (on a swinging perch) develops gradually from the sixth day on.

collecting. The average number of collections reported by those of each age from six to seventeen is given as follows:

AVERAGE NUMBER OF ACTIVE COLLECTIONS FOR DIFFERENT AGES

Age	Av. per Boy	Av. per Girl	Av. per Child
6 years	1.2	1.9	1.4 collections
7 "	2.1	2.6	2.3 "
8 "	3.5	4.5	4 "
9 "	3.9	4.1	4 "
10 "	4.4	4.4	4.4 "
11 "	3.4	3.3	3.3 "
12 "	3	3	3 "
13 "	3.5	3.4	3.4 "
14 "	3	3	3 "
15 "	2.7	3.2	3 "
16 "	2.1	3.3	2.8 "
17 "	2	3	2.5 "

Such errors as children would make in their reports probably would act to make the rise from six to ten seem *more* sudden than it really was. Even as reported, the rise is very gradual.

THE PROBABLE FREQUENCY OF TRANSITORINESS IN ORIGINAL TENDENCIES

James' description of the fact of transitoriness and of its extent in man is the best introduction to the second of our questions. He says:—

"Leaving lower animals aside, and turning to human instincts, we see the law of transiency corroborated on the widest scale by the alternation of different interests and passions as human life goes on. With the child, life is all play and fairy-tales and learning the external properties of 'things;' with the youth it is bodily exercises of a more systematic sort, novels of the real world, boon-fellowship and song, friendship and love, nature, travel and adventure, science and philosophy; with the man, ambition and policy, acquisitiveness, responsibility to others, and the selfish zest of the battle of life. If a boy grows up alone at the age of games and sports, and learns neither to play ball, nor row, nor sail, nor ride, nor skate, nor fish, nor shoot, probably he will be sedentary to the end of his days; and, though the best of opportunities be afforded him for learning these things later, it is a hundred to one but he will pass them by and shrink back from the effort of taking those necessary first steps the prospect of which, at an earlier age, would have filled him with eager delight. The sexual passion expires after a protracted reign; but it is well known that its peculiar manifestations in a given individual depend almost entirely on the habits he may form during the early period of its activity. Exposure to bad company then makes him a loose liver all his days; chastity kept at first makes the same easier later on. In all pedagogy the great thing is to strike the iron while hot, and to seize the wave of the pupil's interest in each successive subject before its ebb has come, so that knowledge may be got and a habit of skill acquired—a headway of interest, in short, secured, on which afterward the individual may float. There is a happy moment for fixing skill in drawing, for making boys collectors in natural history, and presently dissectors and botanists; then for initiating them into the harmonies of mechanics and the wonders of physical and chemical law. Later, introspective psychology and the metaphysical and religious mysteries take their turn; and last of all, the drama of

human affairs and worldly wisdom in the widest sense of the term." ['93, vol. 2, p. 400 f.]

The particular statements of this characteristic passage form a sagacious commentary on the loss of interests as a man grows up and becomes engaged in new pleasures and duties, but it is doubtful whether they do show the law of transiency to be very widely active in human instincts. Two forces, other than the law of transitoriness, must be considered, before attributing the ebbs in man's activities so exclusively to it. The first is the force of new situations—changed circumstances about man—rather than a changed nature in him. The second is the force of changes in his nature due to special acquisitions—learned habits—not to mere losses of transitory instincts and capacities.

Consider, for example, the loss of zeal for 'play and fairy tales and learning the external properties of things' by the youth and grown man. Is not a part of the loss due to changed circumstances? Would not a man regain a portion of his zeal for play, if, say, all the fellow-members of his stock exchange or club or factory began by a miracle to play? Is it not, in part, the avoidance of the disapproval of his fellows which makes the youth or man cast off childish things. Given a situation such that play adds no discomforting moral or social results, and the youth or man *does* seem to act as if the supposedly lost zest had simply been held down by lack of a congenial situation such as it customarily had in childhood. So the student body of a college may all spin tops or play marbles; hard-headed brokers may gambol in an initiation festivity; and joyless politicians may jump up and down and dance in a ring. Are not the pleasures of travel and the stock sports of amusement-parks both evidence that the love of 'learning the external properties of things' persists in fair measure into adult years? New places, new sights, new experiences attract grown men and women also. It is even a stock item in everyday humor that the boy's craving for the circus is his father's excuse. The displays of aeroplanes of the last two years seem to be frequented by adults because of the same interest in learning

the external properties of things which makes the child besiege the engine-house.

Of the difference between the child and the adult in this respect which remains after changed circumstances have been allowed for, is not a part due to the addition of habits rather than the loss of instincts? 'To design a real engine in competition with other inventors under the stimulus of the world's needs expressed in money price and personal distinction' is so much more satisfying to man's nature—even to his original nature—than 'playing cars' or 'playing build bridges,' that the serious habit eventually makes the play out of which it sprang an inferior interest. If a man gets only innocent pleasure from hearing fairy tales, and gets not only innocent pleasure but also comforts for his family from writing them, we must expect that the habit will displace the less remunerative instinct. The youth may be more interested in the *internal* properties of things revealed by mechanics, electricity, chemistry and biology, just because he has already had, and used up, the satisfactions of knowing external facts about chairs and tables, tops and balls, horses and dogs. His apparently new interests may be the same fundamental interest turned to new objects because of a change produced in him by experience. The old objects have lost their appeal because of the connections they have acquired in the course of his training—not because of an inevitable decay of some original welcoming force.

The discounts for changes in the situation and acquired changes in the man, which I have suggested as necessary in the case of 'play and fairy tales and learning the external properties of things,' can be shown to be appropriate in the case of the other losses incurred by the process of maturity which James has chosen.

If this is the case with James's temperate account, what shall we say of those who describe the inner growth of man's instincts and capacities altogether as a series of tendencies, appearing, waiting, lasting a brief space and vanishing unless then and there fixed as habits—like the ripening of fruits which

soon decay unless preserved by the housewifery of habits, or like a procession of candidates which pass through an office, disappearing for good and all unless enlisted at the time and drilled by some recruiting officer of the mind. Such a sharp definition of the rise and fall of original tendencies in a serial order of stages or epochs seems to me to be a gross exaggeration, corresponding only here and there to the actual progress of inner development.

To refute such extravagant notions of the suddenness of appearance of original tendencies, their brevity of stay and their disappearance without other cause than an inherent original transitoriness of the neural bonds, it should suffice to think over the tendencies themselves, each in connection with the treatment it receives at the hands of the changes produced by circumstances in the stimulating situation and responding organism. For example, the readiness of the hunting response persists even in spite of the inadequate stimuli and absence of rewards of a modern village or town, so that, if habitual restraints are removed, men will gladly leave their work to chase an escaped cat. They will, with slight encouragement, undergo notable privations and expense to spend a few days in tracking game and possessing themselves of animal carcasses got by so near an approach as is possible to man's original naked-handed pursuit. Collecting and hoarding survive the penalties which follow childish scavenging and adult waste of time. The drawers, closets and attics of five houses out of ten bear some witness to the tendency. Whole trades maintain themselves by ministering to its continued strength. One of the commonest hobbies of the rich man, though as a boy he may have been much below the average in zeal for collecting for a collection's sake, is to become a bibliophile, or connoisseur in rugs, or collector of paintings. Many stories could be told to illustrate the persistence in us all of that which makes the ten-year-old collect and hoard stamps or cigar tags. Mr. Keppel tells in his *Golden Age of Engraving* of a London dealer in engravings and etchings who, upon inheriting a small fortune,

that day locked his door and for the rest of his life sat like a miser amongst the prints he no longer had to sell. A former librarian of Harvard College is reported to have said exultingly one afternoon, "Every book belonging to the library is here except one and I am going to get that from Professor Child now." Many of my readers indeed will be able to testify to some similar irrational potency of collecting or hoarding in their own lives. The original satisfyingness of having something behind one's back and over one's head when resting which we called the instinct of shelter or habitation persists, as James himself has shown, in our "feigning a shelter within a shelter by backing up beds in rooms with their heads against the walls, and never lying in them the other way." The migratory tendency, if it is instinctive at all, is surely potent even in those who, for long years, could not indulge it. Witness the number of elderly creatures, of even the home-loving sex, whom one finds on trains and steamboats and in hotels.

The most probably instinctive stimuli to fear,—thunder, reptiles, large suddenly approaching animals, darkness and strange persons—seem to retain a fair measure of their power except for contrary habits. Facts of any sort about fears are dubious, and the complications due to training are troublesome to allow for, so that it is conceivable that the occasional manifestations of the tendency keep it alive in spite of an inherent transitoriness. But it would be very risky to undertake to explain even half of the persistent fears of thunder, darkness and strangers as habits retained long after their original impetus had waned. And no one, I judge, will assert that the avoidance of snakes and fear of large animals is an instinct limited to childhood.

So I might continue with pugnacity, motherly behavior, gregariousness, responses to and responses by approval and scorn, mastery and submission, the sex instincts, rivalry, jealous behavior, kindliness, bullying, visual exploration, manipulation, curiosity and the other human original tendencies im-

portant for educational theory and practice.* Transitoriness is a fact; instincts do wax and wane; but the waning is far less frequent, far more gradual and far later in its onset, than the ordinary descriptions of stages, epochs, fluctuations and the like would lead one to believe. Much of human behavior can be explained by certain original tendencies which wane slowly or not at all, except in so far as the consequences of their manifestations stamp them out, or the law of disuse slowly weakens them.

*I may note that a beginning was made with the hunting instinct at random, and that the evidence against early and sudden waning is fully as strong in the case of the 'social' instincts as in the case of hunting, collecting, sheltering, migration and fears.

CHAPTER XVII

The Value and Use of Original Tendencies

At the beginning of this volume it was stated that human welfare required that some original tendencies be cherished, that some be redirected or modified, and that others be eliminated outright. Such is the ordinary common-sense view expressed, for example, by Meumann ['07, edition of '11, p. 699 f.] in the following passage:—

Wherever we compare the child who has been relatively left to himself with the child of like age who has been more subjected to training, we see that the more educated child has progressed very, very much farther than the child left more to himself; and further, where our present education as a whole neglects certain functions, these remain far below what the child might achieve. We could also recall such cases as that of Caspar Hauser, who grew up in a pig-pen and reached only the condition of a beast for lack of education, while he proved himself to be a normally endowed human being as soon as training was given him. We do not, however, need such exceptional cases. We see still more in the two phenomena mentioned here, that wherever the development of the child is even only relatively left to itself, the whole mental development has from the start the character of lack of system and imperfection and inadequacy and pure chance in the results attained. . . .

From these facts it follows that we cannot leave the child to its natural development; for natural development (1) does not attain what the subject of education can achieve by his organization and his capacities, and (2) does not attain what the subject of education as a grown-up human being must attain. We could make this clear by any examples at random, but let me refer only to the development of speech, which shows these two phenomena with especial distinctness. The speech of the child who is left to himself would neither develop in general into a cultivated speech, nor to the correct speech of his surroundings; and the child who is neglected in linguistic

matters remains as a rule quantitatively and qualitatively many years behind the child of good linguistic training. From this it follows that education cannot leave development to itself, wherefore it opposes natural development with a certain pressure. . . . All procedures of education must be oriented from two points of view. They must be at the same time according to ideals and according to nature,—that is, they must strive to realize the aims of education in the best manner, and they can in general do that only if they are adapted step by step to the laws of the development of the child."

To most of my readers it will seem evident that original nature includes tendencies that are good, tendencies that can be used for good, and tendencies that had best be abolished. The fact that maternal affection, curiosity and cruelty are original tendencies would seem sufficient proof of the statement, but it has been denied by two extreme views, one that original nature is essentially wrong and untrustworthy, the other that original nature is always right. The former view, though probably as fair as the latter, is now in universal disrepute and need not detain us. The latter, by being attractive to sentimentalists, absolutist philosophers and believers in a distorted and fallacious form of the doctrine of evolution, has been of great influence upon educational theories. Since it is also championed to some extent by so eminent a student of human nature as Stanley Hall, it must be considered seriously.

THE DOCTRINE OF NATURE'S INFALLIBILITY

By the 'Nature is Right' doctrine, the actual terminus of evolution is the moral end of human action. What is going to be, is right. Our duty is to abstain from interfering with nature, supposing such interference to be possible. A child should be trained up in the way that the inner impulse of development leads him to go. The *summum bonum* for the race is to live out its own evolution with interest and freedom. No stage to which nature impels, should by human artifice be either hastened or prolonged, lest the magic order be disturbed.

The ideal for humanity is to be sought in its natural outcome, in what it of itself tends to be, irrespective of training. Human effort should be to let the inner forces of development do their perfect work.

This doctrine that the unlearned tendencies of man are right is assumed in a vague way as a support for one or another proposal about educational practice more often than it is stated straightforwardly as a general principle. But the quotations that follow will serve as a composite statement and illustration of it as a general principle.

"No influence that works in opposition to this development (that of original nature) and to the law of the inheritance of racial traits in order can ever reach a suitable adaptation, but only disturbs the natural course of development, and creates abnormal, misdirected endeavor." [Schneider, '82, p. 489]

"Only here (in the original tendencies or 'natural development' of the individual and of the race) can we hope to find true norms against the tendencies to precocity in home, school, church, and civilization generally, and also to establish criteria by which to both diagnose and measure arrest and retardation in the individual and the race." [G. Stanley Hall, '04, Preface, p. viii]

"Thus exercise ought to develop nature's first intention and fulfill the law of nascent periods, or else not only no good but great harm may be done." [Hall, '04, vol. 1, p. 208]

"These nativistic and more or less feral instincts can and should be fed and formed. . . . The teacher's art should so vivify all that the resources of literature, tradition, history, can supply which represents the crude, rank virtues of the race's childhood, that . . . the child can enter upon his full heritage, live out each stage of his life to the fullest, and realize in himself all its manifold tendencies." [Hall, '04, Preface, p. xi]

. . . "an evolutionist must hold that the best and not the worst will survive and prevail." [Hall, '04, Preface, p. xviii]

Of motor development Stanley Hall writes: "All parts should act in all possible ways at first and untrammeled by the activity of all other parts and functions. . . . All movements

arising from spontaneous activity of nerve cells or centers must be made." [Hall, '04, vol. 1, p. 161]

The same author uses the alleged fact that in the early 'teens muscular strength increases rapidly, while accuracy in movement improves only slightly as a sufficient reason for advising "that for a few years the stress should incline to the larger sthenic or coarser strength forms of development, and that precision should have less relative emphasis." ['04, vol. 1, p. 147]

Guillet says: "Since it is the order of nature that the new organism should pass through certain developmental stages, it behooves us to study nature's plan, and to seek rather to aid than to thwart it. For nature must be right; there is no higher criterion." [Guillet, '00, p. 427]

Acher says: "It thus becomes the imperative duty of educators to follow this course of development and work with the current of psychic evolution and not against it as is so often the case at present." [Acher, '10, p. 115]

To these extraordinary renunciations of any hope of improving upon the unguided course of inner growth common sense at once opposes the facts that lying, stealing, torturing, ignorance, irrational fears, and a hundred weaknesses and vices, are original in man.

Schneider, Stanley Hall, and others who have proclaimed that 'Nature is right' and used the doctrine as a pillar of their theories of education, were not ignorant of these facts. Nor did they forget such facts temporarily in zeal for their attractive doctrine. They offer, or could offer, three explanations of these apparently wrong original tendencies in man.

First, an original tendency that is undesirable, in and of itself, may be the *prerequisite of some desirable tendency* and hence, on the whole, desirable.

"Children," writes Burk, frequently persist in following some strange, useless or even savage interests quite foreign to our civilization . . . these strange and useless experiences nevertheless may be essential as a platform out of which a higher coördination, useful for modern life, may be reached. The intermediate stage or level may be useless or even inimical

to our civilization, but yet as a link in evolution, be none the less essential." [Burk, F. L., '98, p. 24]

In Stanley Hall's words, "Many an impulse seeks expression, which seems strong for a time, but which will never be heard of later. Its function is to stimulate the next higher power that can only thus be provoked to development, in order to direct, repress or supersede it. . . . Nearly every latency must be developed, or else some higher power, that later tempers and coördinates it, lacks normal stimulus to develop." ['04, vol. 2, pp. 90-91] Thus the miscellaneous and apparently futile finger movements of babies may be a necessary fore-runner of reaching, grasping, holding, and the like.

Second, An original tendency, undesirable in and of itself, may on the whole be desirable because it is the *necessary correlate or result of some desirable tendency.*

The tendency to righteous anger may involve a tendency to mere raging. Love may be unable to exist in full measure without jealousy of the irrational, cruel and mean sort. In Stanley Hall's opinion, "An able-bodied young man, who can not fight physically, can hardly have a high and true sense of honor, and is generally a milk-sop, a lady-boy, or a sneak." ['04, vol. 1, p. 217]

Third, a tendency undesirable in and of itself would, on the whole, be desirable, if *by its presence in early life, man is protected from the same tendency later.*

If being a thief at five and a bully at ten kept one from being a thief and a bully from twenty-five to seventy, these original tendencies would of course be desirable as lesser evils. That original tendencies do sometimes thus preventively inoculate and immunize has been asserted by Stanley Hall and many of his followers.

THE DOCTRINE OF CATHARSIS

A few quotations may serve to present this doctrine fairly.

"Rudimentary organs need to be not only developed, but often used in order to dwindle in form and function, and to make place for the next higher organs and functions, for which they, in the higher forms of life, are mere, although indispensible, succedanea. Stimulus and use, at a certain stage, seem to be necessary, not to make them develop, as in the case with most tissues . . . but to directly cause their gradual atrophy." [Hall and Allin, '97, p. 17]

"Rudimentary organs of the soul now suppressed, perverted, or delayed, to crop out in menacing forms later, would be developed in their season so that we should be immune to them in maturer years." [Hall, '04, Preface, p. x]

. . . "faculties and impulses, which are denied legitimate expression during their nascent periods, break out well on in adult life." [Hall, '04, vol. 2, p. 90]

"It seems a law of psychic development, that more or less evil must be done to unloose the higher powers of constraint and to practice them until they can keep down the baser instincts." [Hall, '04, vol. 2, p. 83]

Burk, who does not himself decide that the doctrine of immunization by early attacks is true, gives one of the best statements of it in the case of teasing and bullying. It is, he says,— "the view that exercise of these impulses in children's plays and games does not strengthen them, but, on the contrary, drains off the energy in a natural and harmless way, in a sort of vaccination sense. If these impulses were not allowed free expression in natural plays and forms of amusement, such as teasing, then in their restraint this energy would remain as a poison to the whole system and later give rise to criminal outbreaks. This view regards the plays of childhood as the safety valves to prevent repression and internal development in forms later to break forth in deeds of criminal passion." ['97, p. 370]

"Now what are the applications of this view to many of these strange complexes that appear in early childhood, even to include such seemingly evil forms as those which appear in cruelty, bullying and teasing? May it not be, indeed, that they constitute a level in the evolutionary hierarchy, and though in themselves useless, are nevertheless an essential platform from

which the coördinations of a higher and useful level are formed? It is plausible that the child needs to live to some extent the life of his ancestors in order actually to develop in his own nervous system the kinaesthetic sensations which by the process of higher evolution may serve as the basis for higher forms of activity in the highest levels? It becomes indeed a question of extreme nicety to determine just the exact moment when sufficient actual experience has fully established the racial tendency and the time for inhibition and radiation of the force into higher cerebral associations should follow. Danger of arrest of development at the lower stage is as important as that the fundamental impressions should not be made. Such a view gives these curious phenomena a natural place in child life, and emphasizes the probability that children's plays and games, as mild vaccination forms, serve as mediations between brutal ancestral tendencies in the nervous system, and the higher levels employed in altruistic modern life, between savage racial action and civilized ideation." [Burk, '98, p. 42]

Stanley Hall uses the term *Catharsis* as a name for this doctrine of later immunity through early indulgences and also for the radically different doctrine that later immunity is favored by early esthetic contemplation of the vice or imaginative participation in it.* The second use appears in such statements as:

"I incline to think that many children would be better and not worse for reading, provided it can be done in tender years, stories like those of Captain Kidd, Jack Sheppard, Dick Turpin, and other gory tales, and perhaps later tales like Eugene Aram, the ophidian medicated novel, Elsie Venner, etc., on the principle of the Aristotelian catharsis to arouse betimes the higher faculties which develop later, and whose function it is to deplete the bad centers and suppress or inhibit their activity." ['04, vol. 1, p. 408]

The extent to which this doctrine of immunization by early wrong-doing is carried is well illustrated in the following

*In this second form, the doctrine of Catharsis lends no support to the theory of nature's infallibility in the case of the tendencies toward *actual* greed, cruelty, envy, jealousy, lust and revenge. It defends only indulgence in the contemplation of representations of such actualities.

recommendations of selfishness, greed, lying and cheating by Kline and France:—

"Do we believe that the child recapitulates the history of the race? If so we may not be surprised to find the passion for property-getting a natural one, nor that the child lies, cheats and steals to acquire it or that selfishness rules the child's actions. Selfishness is the cornerstone of the struggle for existence, deception is at its very foundation, while the acquiring of property has been the most dominant factor in the history of men and nations. These passions of the child are but the pent up forces of the greed of thousands of years. They must find expression and exercise, if not in childhood, later. Who knows but what our misers are not those children grown up whom fond mothers and fathers forced into giving away their playthings, into the doing of unselfish acts, in acting out a generosity which was neither felt nor understood. Not to let these activities have their play in childhood is to run a great risk. It does no good to make the child perform moral acts when it does not appreciate what right and wrong mean, and to punish a child for not performing acts which his very nature compels him to do, is doing that child positive injury.

During the period of adolescence, generosity and altruism spring up naturally. Then why try to force the budding plant into blossom? Instruct them by all means, teach them the right; but if this fails, do not punish, but let the child be selfish, let him lie and cheat, until these forces spend themselves. Do not these experiences of the child give to man in later life a moral virility?" ['99, p. 455]

DEFECTS IN MAN'S ORIGINAL NATURE

These three subsidiary hypotheses (that an intrinsically undesirable tendency may be the prerequisite of some desirable tendency, or its necessary correlate, or the means of immunization from a similar but worse tendency later) do not, however, supply all the shortcomings of the 'Nature is Right' doctrine. The first and second of them, while very probably true of certain tendencies, do not provide greed, insane rage, cruelty, and many others, with any adequate excuse. The experience of families, schools and states, has not found that interference

with these instincts withers the hopes of any noble traits. Nor does present knowledge of the relations of mental traits lead us to expect that these instincts are necessarily bound to any compensating advantages. The great majority of the original tendencies which can be defended by the hope that they are bound as cause or effect or correlative to some valuable quality of mind are either such as no wise judge would consider wrong —for example, general activity of body and of mind; or such as produce the good quality *only by being interfered with, redirected, modified* in situation, response, or both.

The third hypothesis, that rage, teasing, bullying, envy, neglect of absolute values, and the like, will, if denied exercise, inhibited or redirected when they appear as man's original nature decrees, be all the more potent and mischievous in the long run, is then necessary if nature's infallibility is to be saved. It was in fact invented to save it.

Very strong evidence should be required before believing that the exercise of any function thus weakens it. For such mental immunization is directly contrary to one of the most nearly universal laws of mental life, the law of exercise. Still stronger evidence should be required before believing that the exercise of any function to which an original impulse leads weakens it. For the exercise of an *original* tendency is almost always satisfying, other things being equal. Hence mental immunization by an early attack is here directly contrary to the law of effect.

There can, indeed, be no doubt that the laws of habit are the rule, that ordinarily the exercise of any tendency with satisfying or indifferent results strengthens the tendency, and that an original tendency will persist unless it is transitory by nature, is prevented from functioning, or is checked or redirected by other forces. If immunization by early indulgence occurs at all, it occurs as an exception for which adequate special reasons must be given.

No one has given adequate special reasons, or indeed reasons of any kind worth mentioning. In fact, Stanley Hall

himself often abandons the doctrine and returns to the orthodox theory that education must redirect original tendencies. For example, he writes that we shall "utilize most of the energy now wasted in crime by devising more wholesome and natural expressions for the instincts that motivate it" ['04, vol. 1, p. 342]. Anger's "culture requires proper selection of objects and great transformation, but never extermination." ['04, vol. 1, p. 355] "The popular idea, that youth must have its fling, implies the need of greatly and sometimes suddenly widened liberty, which nevertheless needs careful supervision and wise direction." ['04, vol. 2, pp. 89-90] Hall even says flatly that "the spontaneous expressions of this best age and condition of life (youth in college), with no other occupation than their own development, have shown reversions as often as progress." ['04, vol. 2, p. 399]

Finally it must be said that under the pressure of obvious facts even the most ardent advocates of nature's infallibility always somewhere give the doctrine up. So Stanley Hall writes:—

. . . "now another remove from nature seems to be made necessary by the manifold knowledges and skills of our highly complex civilization . . . the child must be subjected to special disciplines and be apprenticed to the higher qualities of adulthood, for he is not only a product of nature, but a candidate for a highly developed humanity. To many, if not most, of the influences here there can be at first but little inner response. . . . The wisest requirements seem to the child more or less alien, arbitrary, heteronomous, artificial, falsetto." ['04, Preface, p. xii]

Burk's compromise is explained in the two following quotations:—

"There is a familiar dispute in pedagogy whether or not the child should be always allowed to follow his inclinations. One party maintains the extreme position that we should follow blindly the child's interest. Another party stands aghast at the proposal. From this present standpoint taken must we not first discover whether a specific tendency in question is "fundamental" or "accessory?" If deeply fundamental, we

must follow nature. If the tendency is one in its accessory period of development, we may perhaps allow objective factors largely to determine." [Burk, '98, p. 49]

"1. That, taking the activities independently, there is an early period in the development of each part or process, when the purpose of education must be to follow the fixed innate hereditary line of tendency, and to allow the racial instincts fullest play of development (fundamental education).

2. That there follows a later period, in an activity's development, when it passes partially out of the fixed control of racial habit, and becomes more plastic to present environment (accessory education)." [Burk, '98, p. 63]

Guillet, who asserts that 'Nature must be right,' later unconsciously recants fully. "These instincts, then, which every child has . . . must be turned into worthy grooves. Not suppression, but a generous control" ['00, p. 445]

So, after climbing to the dizzy height of the faith that original nature is perfect and balancing there awhile with the aid of the doctrine of preventive inoculation, we all come down again to the solid fact that original nature is very often and very much imperfect and wrong.

The imperfections and misleadings of original nature are in fact many and momentous. The common good requires that each child learn countless new lessons and unlearn a large fraction of his natural birthright. The main reason for this is that original equipment is archaic, adapting the human animal for the life that might be led by a family group of wild men in the woods, amongst the brute forces of land, water, wind, rain, plants, animals, and other groups of wild men. The life to which original nature adapts man is probably far more like the life of the wolf or ape, than like the life that now is, as a result of human art, habit and reasoning, perpetuating themselves in language, tools, buildings, books and customs.

It is a useful, if trite, exercise to consider this enormous gap between the fate of man left to what the human germ plasm has learned and the opportunity to which the learning of men themselves calls each new generation. How easily we revert to a nearly simian brutality when the records and

restraints of civilization fail is the best proof and illustration of the unfitness of original nature to rule the behavior of man.

Other illustrations in abundance can be found of the archaic unreason of original nature, or, more scientifically, of the thoroughgoing transformation which life undergoes in proportion as human reason works back upon the conditions of things and the wants of men. By the germs' decree we fear, not the carriers of malaria and yellow fever, but thunder and the dark; we pity, not the gifted youth debarred from education, but the beggar's bloody sore; we are less excited by a great injustice than by a little blood; we suffer more from such scorn as untipped waiters, cabmen, and barbers show, than from our own idleness, ignorance and folly.

It is also true that even to a brute's life in the woods human instincts are not perfectly adapted, or without gross errors. To exist, a species needs to behave so as to exist, but not so as to exist well. A species can, and most species do, make many blunders in life. 'Good' means in evolution only 'good enough to keep the species from elimination,' and 'best' means only the surest aids to survival that have happened to happen.

The original tendencies of man have not been right, are not right, and probably never will be right. By them alone few of the best wants in human life would have been felt, and fewer still satisfied. Nor would the crude, conflicting, perilous wants which original nature so largely represents and serves, have had much more fulfilment. Original nature has achieved what goodness the world knows as a state achieves order, by killing, confining or reforming some of its elements. It progresses, not by *laissez faire,* but by changing the environment in which it operates and by renewedly changing itself in each generation. Man is now as civilized, rational and humane as he is because man in the past has changed things into shapes more satisfying, and changed parts of his own nature into traits more satisfying, to man as a whole. Man is thus eternally altering himself to suit himself. His nature is not right in his own eyes. Only one thing in it, indeed, is unreservedly good, the power to make

it better. This power, the power of learning or modification in favor of the satisfying, the capacity represented by the law of effect, is the essential principle of reason and right in the world.

THE USE OF ORIGINAL TENDENCIES IN DETAIL

Since original nature is neither all wrong, as our Puritanic ancestors tried to believe, nor all right, as the modern disciples of educational *laissez faire* try to believe, we cannot deal with it wholesale. Reason has to improve on nature without wasting it, by using each of its tendencies in view of all the rest and in view of the complicated apparatus of things and customs with which original nature interacts.

The problems of whether to cherish the tendency as it is, to inhibit it altogether or to modify it in part and, in the last case, the problem of just what modification to make—may occasionally be solved easily, but oftener demand elaborate study, rare freedom from superstition, and both care and insight in balancing goods. Indeed, many of the answers which to us now seem self-evident and sure were got only by long experiment and the acuity of some sage of the past.

It seems clear to us now that the extreme cultivation of the instincts of submissive and frightened behavior in the masses through centuries past restrained progress and denied the common good; we can hardly help inferring that the leaders of men were much less humane then than now, and perpetuated submission and fear rather than curiosity, experimentation and kindliness, wholly in their own selfish interest. But greater ignorance rather than greater ill-will was probably the major cause of the difference between then and now. The kings, priests and teachers of those days did not know that men could be trustworthy through freedom, and virtuous through love and self-respect.

Again, we are able to see the value of studying, rather than propitiating, the world's forces, simply because the Galileos, Kepplers and Darwins have taught us. It is well to recall that

Galileo was persecuted by 'the best people' of his time and that within a life-span there were honorable, devoted servants of human welfare who would have thanked God in the best of faith if fire had come down from Heaven to destroy Darwin and the *Origin of Species* with him.

Consider the 'best present practice,' which permits and encourages the instincts of curiosity, mental control and multiform mental activity to work for years with the cheap fancies about flowers, seeds, and animals, devised by ignorant women; or with the petty details of bygone mythologies; or with little or nothing in national life save its military campaigns; or with the elaborate mnemonic and deductive exercises of the Latin language; or with unreformed spelling. To the author it seems clear that the direction of these instincts into these channels is an intolerable waste. But it does not seem so to others with equal or better rights to decide.

Or take the very kindliness, of which some of us, in our zeal for the brotherhood of man, cannot have too much. We may be shocked to find a part of the plea of the drunken don in Wells' story for 'hate and coarse thinking' made soberly by a gifted psychologist. But we, who would choke off personal hate into antagonism toward qualities and actions alone, must find answers to Professor McDougall's contention that anger and fighting have been blessings in disguise.

"It might seem at first sight that this instinct, which leads men and societies so often to enter blindly upon deadly contests that in many cases are destructive to both parties, could only be a survival from man's brutal ancestry, and that an early and a principal feature of social evolution would have been the eradication of this instinct from the human mind. But a little reflection will show us that its operation, far from being wholly injurious, has been one of the essential factors in the evolution of the higher forms of social organisation, and, in fact, of those specifically social qualities of man, the high development of which is an essential condition of the higher social life." ['08, p. 281, f.]

This contention McDougall supports by arguing that early

in man's history the power of subjecting one's impulses to a recognized law arose from fighting within the family group; that, later on, fighting was a necessary condition for the development of coöperative life; and that, even today, energy, independence and manliness depend upon the presence of this instinct in full strength.

"When in any region social organisation had progressed so far that the mortal combat of individuals was replaced by the mortal combat of tribes, villages, or groups of any kind, success in combat and survival and propagation must have been favored by, and have depended upon, not only the vigour and ferocity of individual fighters, but also, and to an even greater degree, upon the capacity of individuals for united action, upon good comradeship, upon personal trustworthiness, and upon the capacity of individuals to subordinate their impulsive tendencies and egoistic promptings to the ends of the group and to the commands of the accepted leader. Hence, wherever such mortal conflict of groups prevailed for many generations, it must have developed in the surviving groups just those social and moral qualities of individuals which are the essential conditions of all effective coöperation and of the higher forms of social organisation. For success in war implies definite organisation, the recognition of a leader, and faithful observance of his commands. . . ."

"This process must have developed not only the individual fighting qualities, but also the qualities that make for conscientious conduct and stable and efficient social organisation. These effects were clearly marked in the barbarians who overran the Roman Empire. The Germanic tribes were perhaps more pugnacious and possessed of the military virtues in a higher degree than any other people that has existed before or since. They were the most terrible enemies, as Julius Caesar found; they could never be subdued because they fought, not merely to gain any specific ends, but because they loved fighting, i.e., because they were innately pugnacious. Their religion and the character of their gods reflected their devotion to war; centuries of Christianity have failed to eradicate this quality, and the smallest differences of opinion and belief continue to furnish the pretexts for fresh combats. Mr. Kidd argues strongly that it is the social qualities developed by this process of military group-selection which, more than anything else, have

enabled these peoples to build up a new civilisation on the ruins of the Roman Empire, and to carry on the progress of social organisation and of civilisation to the point it has now reached." ['08, pp. 286-291, *passim*]

European people and the Japanese *versus* the Chinese and Hindoos, are used as evidence of this supposed relation.

McDougall's argument seems to me fallacious in that, as he himself indeed later suggests, pugnacious behavior is a symptom, rather than a cause, of energy, and subjection to law and coöperation for the good of the community could have developed, and perhaps did develop, rather from hunting, agriculture, industry and sport than from combat with other men. Whatever be the past and present goods and evils of fighting, however, a too abstract and indiscriminate cultivation of gentleness, love and fine thinking is surely risky. We must cherish kindliness without incurring pusillanimity; and must correct pugnacity without putting the men in whom we have directed it toward abstract evils at the mercy of any embryonic Napoleons in whom we have left its selfish aggressiveness unimpaired.

So much for a warning that the opportunities for sagacity in evaluating human original tendencies as ends, and in adapting them as means to other ends, are practically inexhaustible. The warning also implies that any account of the use of particular original tendencies must be incomplete. The account to be given here will be still more so, of deliberate purpose. I shall not try to give here even a résumé of the little that is known, but only two sample notes—one to illustrate the problems of the use of original tendencies as ends; the other to illustrate their use as means,—and a review of some of the general facts needed to economize planning and experimentation with such problems. Any further details may best be left to treatises on special lines of educational endeavor. Books on the 'Teaching of Reading' or the 'Teaching of Arithmetic,' or 'Moral Education,' or 'Education in Music' or 'The Prevention of Crime,' or 'The Reform of Marriage,' or the like, should in

each case begin with an account of the way in which original nature is to be used toward the attainment of the particular features of eventual nature which are its topics.

The two notes will deal with the use, or rather misuse, of *emulation as an end* and of *ideomotor action as a means*. The general facts reviewed will be, in order:

Original *versus* 'Natural' tendencies.
The Importance of the Original Satisfiers and Annoyers.
The True Significance of Plasticity.
Which Instincts are of Most Worth?
Original Nature as the Ultimate Source of All Values.

ORIGINAL TENDENCIES AS ENDS: EMULATION IN THE CASE OF SCHOOL 'MARKS'

Present customs with respect to the measurement of a pupil's achievement in school studies fall into two groups. On the one hand, we have a somewhat detailed record kept, and made known to the student, in terms of a scale from 0 to 100, or from F through D--, D, D+, C--, C, C+, B--, B, B+, A-- to A or A+. On the other hand, we have a deliberately crude record kept and made known to the student—such as F or P, or F, D, C, B, A. Or we have a crude or detailed record kept, but only some crude features of it made known to the student. During the last thirty years there has been a very strong movement from detailed to crude records of achievement, and from publicity to secrecy.

The reasons alleged for the change have been that detailed grades and publicity encourage a pupil to work for 'marks,' and for excellence in the sense of excelling others, instead of for knowledge or power, and for excellence in the sense of improvement.

In my opinion the change was an extremely wasteful way of avoiding one evil by the unnecessary sacrifice of all its attendant goods—a way whose wastefulness should have been apparent upon consideration of the nature of the situations

involved and the original tendencies used. The essential fault of the older schemes for school grades or marks was that the '86' or 'B--' did not mean any objectively defined amount of knowledge or power or skill—that, for example, John's attainment of 91 in second-year German did not inform him (or anyone else) about how difficult a passage he could translate, how many words he knew the English equivalents of and how accurately he could pronounce, or about any other fact save that he was supposed to be slightly more competent than someone else marked 89 was, or than he would have been if he had been so marked.

The marks given by any one teacher, though standing for some obscure standards of absolute achievement—that is, amounts of actual knowledge, power, skill, and the like—in the teacher's mind, could stand, in the mind of anyone else unacquainted with these inner meanings, only for degrees of relative achievement—for being at the top or at the bottom, for being above or below something. Inevitably other pupils were chosen as that something, and, except in the case of the one objectively defined difference between enough and not enough to allow promotion to the next class, school marks functioned as measures of superiority and inferiority amongst pupils, and of little else. A pupil who made excellence an aim of his school work was encouraged by every feature of the school's measurements of his work to think of excellence as *excelling others—relative achievement—outdoing someone else.* Finding that pupils did so, and being rightly suspicious of this gross form of emulation as an end in education, school officers took the easy, but wasteful, way of depriving the pupil of any save the vaguest knowledge of his achievement. To keep him from focussing his attention upon his achievement in comparison with his fellow students' achievements, they kept from him any detailed record whatsoever of his achievement.

To work for marks is not intrinsically bad. If the marks are, as they should be, correct measures of either the amount of knowledge, power, appreciation and skill attained or the

amount of progress made, to work for marks means simply to work for knowledge, power, increase in knowledge and power and the like as recognized and measured. The detailed nature and the report to the individual of his school marks were not the vices of the old system. Its vice was its relativity and indefiniteness—the fact already described that a given mark did not mean any defined amount of knowledge, or power, or skill— so that it was bound to be used for relative achievement only.

The proper remedy is not to eliminate all stimulus to rivalry, and along with it a large part of the stimulus to achievement in general, but to redirect the rivalry into the tendencies to go higher on an objective scale for absolute achievement, to surpass one's own past performance, to get into what, in athletic parlance, is called a 'higher class,' to compete within that class, and to compete coöperatively as one of a group in rivalry with another group.

Suppose, for example, that instead of the traditional '89's or 'good's a pupil had records of just how many ten-digit additions he could compute correctly in five minutes, of just how difficult a passage he could translate correctly at sight, and of how long it required, and the like. He could, of course, still compare himself with others, but he would not be compelled to do so. He could be encouraged, instead, to compare his present achievement with last month's, to beat his record, or the record for an average ten-year-old, and to work for entrance to a 'twenty-example' class comparable to the 'two-thirty' class of trotting horses. In fact, in so far as excelling others would under these conditions imply and emphasize making absolute progress upward on a scale for real achievement, and would mean that a pupil outdid by a special effort those who ordinarily could do as well as he—those in his own 'class' as that term is used in sport,—even direct rivalry with others would be innocent and healthy.

Rivalry with one's own past and with a "bogey," or accepted standard, is entirely feasible, once we have absolute scales for

educational achievement comparable to the scales for the speed at which one can run or the height to which one can jump. Such scales are being constructed. The strength of such impersonal rivalry as a motive, while not as great for the two or three who would compete to lead the class under the old system as that system's emphasis on rivalry with others, is far greater for the rest of the group. To be seventeenth instead of eighteenth, or twenty-third instead of twenty-fifth, does not approach in moving force the zeal to beat one's own record, to see one's practice curve rise week by week, and to get up to the standard which permits one to advance to a new feat. Mr. T. H. Kirby* found in the case of fifth-grade pupils that, by thus reporting to each pupil his absolute achievement in measured tests in addition, sixty minutes of drill resulted in an improvement of over 50 percent in speed with a slight gain in accuracy as well.

ORIGINAL TENDENCIES AS MEANS: SUGGESTION IN EDUCATION

If there were in human nature an original tendency to act out in conduct any idea present in consciousness, an easy and universal means to moral improvement would be to inoculate the mind with ideas of good acts. If all motor representations tend to realize themselves in movement the most remunerative form of education for skill and morals is to fill the mind with representations of the desirable movements.

Many thinkers about moral education have assumed the truth of the ideo-motor theory and so have trusted that presenting stories of noble acts was such a universal means of ennobling conduct. For example, Thomas says that "An idea . . . always implies, in different degrees, an activity which tends to spread, a power which tends to pass into action and cause bodily movement. . . . To think of play or of study is truly for them (children) to play and to study." ['07, p. 5 f.] Sisson notes that the child "has a distinct tendency to do what

*In an investigation not yet reported in print.

he sees done, or hears about, or whatever in any way comes into the range of his perception. All these tendencies which are really summed up in the last sentence, constitute what is called suggestibility, or the tendency to repeat in one's own person any act the image of which enters the mind. The most clearly recognized form of this great tendency is, of course, imitation." ['10, p. 13 f.]

The logical consequence of this doctrine is confidence that tales of heroism, thrift, sacrifice, studiousness and other virtuous deeds will tend to create them in the hearers—will surely create them except for the existence of ideas of contrary acts or strong contrary habits. So Thomas says:—

"If the state of perfect monoideism could be realized, the execution of an act would always follow immediately the conception of it, and we have seen that such is frequently the case with children; but in the state of polyideism which is the mind's ordinary condition the case is different. Consciousness is the theatre of an incessant conflict which we take account of only at the moment of deliberation." ['07, p. 13]

Keatinge writes to the same effect:

"A certain portion of the mental content is attended to and becomes the idea which fills the focus of consciousness. Suppose it to be the idea of giving the whole of one's property for charitable purposes. As an idea this possesses the constant energy of all ideas in the tendency to realize itself. But the field is not clear for it. It is obstructed (a) by the inherited impulses and tendencies of self-protection, which incline one to make certain that one's own welfare is assured; (b) by the impulses arising from habit, which look askance at the tendency to give more than the small portion of income which is usually assigned to charity; (c) by a number of family prudential ideas, such as the duty of educating one's children or of assisting poor relatives; (d) by the fear that indiscriminate charity may do harm. As a result the incipient tendency to the renunciation of worldly goods is strangled at birth, and its only contribution towards the mental system in which it occurs is that of initiating a train of association. On the other hand (a) I may be the possessor of professional skill which enables me to earn my livelihood with ease, and may therefore be in

no fear of indigence; (b) I may have inherited the fortune suddenly and therefore may have no established habits of dealing with money on a large scale; (c) I may dislike my children and my relatives; (d) I may be ignorant of the economics of social life. In this case the idea will be operative, and yet it is ex hypothesi the same idea as in the former case; the same impulse to give combined with the same conception of suffering, and the same anticipation of the pleasure to be derived from munificence to others. Stated schematically, an idea A introduced into a mental system has a tendency by association to call up other ideas and impulses, B, C, D, which may be (1) contrariant, critical, and inhibitory; (2) sympathetic and furthering. This is its total association value, and it works equally in all directions; it calls up ideas that are friendly to it and also ideas that are hostile. *This enumeration does not exhaust its latent powers. It possesses also a suggestive energy which may be converted into suggestive force, and which overcomes or avoids the resistance offered to it so that action results.**

"These two qualities of an idea must be clearly distinguished. The associative tendency is not necessarily a tendency to action or belief. I may mass together a number of ideas that deal with a certain line of conduct, but the result may be no more than a clear understanding of the positions; for increased insight by no means leads to action if there is in existence a system of opposed ideas and impulses, and such a system is often called into existence in proportion to the size of the favoring system; while, on the other hand, an idea in so far as it is suggestive tends to realize itself quite apart from insight or understanding." ['07, p. 30 f.]

This confidence that an idea will be realized in behavior if only we can get it into the mind and keep the opposite ideas out, has as its consequence, in turn, the expectation of vast moral improvement from the study of literary descriptions of virtue, the subservience of the scientific and practical aims to the moral aim in the teaching of history, and in the end the deliberate insertion in the curriculum of subject-matter chosen because it gives impressive ideas of good acts and so, supposedly, creates them.

*Italics not in the original.

It is, however, obvious to sagacious observers that ideas of good acts do not always, or even perhaps often, create good acts in this easy way, and that the effect in any case varies greatly with the individual and with the sources of the idea. So the very moralist who has boldly proclaimed that ideo-motor action is a fundamental law of conduct, may accept none of its logical consequences. Mr. Keatinge, for example, though specially interested in ideo-motor action, imitation, and suggestion, is compelled by his sense of fact to limit and encumber their action to such an extent that almost all of the practical advice given in his book, *Suggestion in Education,* might almost, if not quite, as well have appeared under the title *Habit-Formation in Education,* or even *The Falsity of the Ideo-motor Theory.*

The whole practice of Suggestion, in medicine, government and business as well as in teaching, is, indeed, a mixture of wise action, based on certain undoubted powers of ideas to produce effects in behavior and of more or less crass charlatanism. The same theory of ideo-motor action that is required for the former apparently can be used to justify the latter.

It is, of course, my contention that the theory itself is wrong—that an idea does not evoke the act which is like it, but the act which has followed it without annoyance—that successful suggestion toward an act consists in arousing, not the state of mind which is like that act, but the one which that act follows by instinct or habit, and in preventing from being aroused the state of mind or body which some contrary act so follows. If, whenever John Smith thought of running away howling, he did in fact stay and confront the foe, a most potent suggestion to courage would be to get him to think of himself as running away and howling.

Everyone admits that in a vague sense suggestion may be potent. What is needed is some principle that will distinguish between its successes and its failures, between its scientific use and imposture. The ideo-motor principle in its stock state-

ments does not, the result being that efficiency in the use of suggestion either is falsely expected to result in cases where it can be proved not to do so, or is left dependent on an unpredictable combination of prestige, personal magnetism, rare skill and intuition born of experience.

If the doctrine of this book is true, suggestion will succeed in so far as it is a process of manipulating a person's ideas and attitudes so as to get him into a situation to which the desired response rather than another is connected by the laws of instinct, exercise and effect. It will fail in so far as it pretends to do anything more than this. An examination of the successes and failures of suggestion to see whether they do, in fact, follow this rule would be instructive, but I have found so great difficulty in getting the necessary data that I shall not attempt it.

ORIGINAL VERSUS 'NATURAL' TENDENCIES

The so-called *'natural'* proclivities of man represent enormous changes from his *original* proclivities. The effects of learning are as surely present in the common liking of boys for hunting, fishing, adventure and sport in the present senses of those words, as in their rare liking for geometry, computation and grammatical precision. Original nature knows nothing of guns, fishhooks, rods and reels, canoes, tennis or foot-balls. Its tendencies may go so far as to specially enjoy throwing a small heavy thing held in the hand, and swinging a club-like thing held by one end, but the majority of the so-called 'natural' interests are largely acquired.

The doctrine that the 'natural' is the good, and should be the aim of education, is then very different from the doctrine that *original* nature is right. It is a shifting, indeterminate doctrine, meaning one thing in 5000 B. C., another thing today, and something else a generation hence. It amounts roughly to declaring that the mixed product of original nature and the unconscious tuition of common circumstances and customs has ultimate value. That is false. Equally false is the doctrine that the 'natural' is essentially evil.

One unfortunate result of the use of 'natural' for a mixture of original and taught proclivities is to unduly discourage educational and other social reforms. The original must be reckoned with; if odious it must be got rid of against resistance. In so far as laziness, tyranny, prostitution, superstition and the like are consequences of original connections, the respective reforms are made hard. But much of the so-called 'natural' iniquity in man is produced by training, the only action needed for reform being to abolish the artificial stimuli to the evil behavior. Sacrifice of living men to idols, belief in the divine right of kings and legal ownership of human beings were natural enough in their day, but no special effort is required to keep the children of New York City from reverting to such beliefs and practices.

The same argument holds for false expectations of stability in the case of 'natural' behavior that is useful. It is 'natural,' under certain conditions of American life, to expect and exercise a certain degree of freedom in speech and print, and to entrust the punishment of the burglar in one's house to the courts, but this naturalness has been earned by a laborious struggle in the past and is maintained against resistance. A publicist who relied upon either of these tendencies to the same extent that he relied on instinctive babbling or gregariousness would make an egregious blunder.

The question as to just how much of any 'natural' behavior is really original is thus often of great practical moment. Today, theft is far the more 'natural,' but homicide is perhaps the more original, of the two crimes. War between governmental units is perhaps far less original than it has been thought to be. Natural as it is, the desire to get something for nothing, as in gambling, may be largely a product of training. Female devotion to cooking and sewing has been so natural as to be esteemed a divine ordinance, but its only original elements may be less enjoyment of hunting behavior and a keener enjoyment of seeing human beings comfortable.

THE IMPORTANCE OF THE ORIGINAL SATISFIERS AND ANNOYERS

It should be clear from facts already stated that the original tendencies of certain states of affairs to satisfy or to annoy are among the most potent determinants of human behavior and of those changes in it which result from education. Satisfaction and discomfort are in fact the great educative forces. They are such originally, and become still more so by virtue of the fact that behavior which is accompanied or closely followed by them becomes itself satisfying or annoying as the case may be. They are of very great value in the control of human nature because they are the roots of the phenomena which we call interests, desires, wants and motives.

The original tendencies whereby this satisfies and that annoys are thus the ultimate selective forces in human behavior, providing the first rewards and punishments for education's use. From them, directly or indirectly, all later wants, interests and ideals derive their motive power. There is no other means of arousing zeal for a given course of thought or conduct than by connecting satisfaction with it; the mind does not do something for nothing.

The original satisfiers and annoyers show themselves emphatically to any competent observer who divests his attitude of the prejudices due to his individual make-up, to the elaborate reconstruction of his own satisfiers and annoyers by the circumstances of modern life and education, and to the abstract caricatures of man's wants which a too scholastic science has drawn. But such impartiality and sympathetic insight into fundamental human cravings are hard to attain. The quiet, peace-loving scholar is prone to regard the teasing and horse-play of youth as a profitless mania which a few words of advice should cure in all save the intellectually or morally perverse! The father, taught by school and shop to value only the products of activities, thinks he will satisfy his little son by nailing the boards, or filling the pail with sand, or sailing the boat, for him! The economist has counted on a man possessed by a

single-hearted craving for food and shelter, and avoidance of pain and productive labor! Some moralists have discussed man as if he were a monomaniac seeking only sensory pleasures and avoiding only sensory pains! Many metaphysicians have seemed to suppose that man's thinking was governed by a burning annoyance at contradictory judgments.

To free oneself from such prejudices and narrow inventories of man's original interests is the first step toward a reasonable use of them. The second is put the useful ones to work and guard against the dangerous ones. Thus the very little child's satisfactions at bringing things to the mother and at carrying through a project to which original nature impels him are roots of coöperation and helpfulness and achievement. Thus, the satisfactions of sex indulgence or of absolute mastery over other human beings (as by position or wealth) are so potent and so disturbing to modern plans for man's welfare that chastity, equality and poverty should probably be the rule until the individual, by having been taught to find satisfaction in the welfare of others, the maintenance of an ideal self and the impersonal pleasures, has proved himself fit to use his body, position and wealth.

The third element in rational use of nature's capital of motives is to exercise ingenuity in attaching and detaching satisfaction and discomfort to and from this and that particular situation or feature of a situation. The genius at human engineering will learn to apply these forces with a skill like that whereby the mechanical and chemical engineers use the forces of gravity and atomic affinities. The triumphs so possible are of course not for me to illustrate, but I may note two obvious principles. First, the satisfyingness of a state of affairs is not an abstractly, uniformly potent thing, but depends on the total behavior-series in which the state of affairs happens. A boy may like to be petted by his mother, but not in public; he may like to work with tools when some special achievement has been suggested, but not when told, 'There are your tools; play with them.' The second fact is that the states of affairs which

are constituted by the approval, scorn, kindliness and anger and the like of other human beings may fail of efficacy because of even slight departures from the typical original form of the behavior in question. Thus a parent or teacher who is reserved and constrained may, though sincerely approving, have the effect of indifference; on the other hand, a showy pretense at kindly interest is likely to be responded to as the meddling which it really is. Children must not be expected to be mind-readers, nor on the other hand should any one hope that the ostensible meaning of words will substitute for the subtle characteristics of bodily attitude, facial expression, and quality of voice.

Besides putting us in possession of control over the springs of conduct, recognition of the facts about satisfiers and annoyers serves to correct false views of the psychology and pedagogy of interest, especially the view that interest is nothing but the attitude of attentiveness and that the educational problem of interest is nothing more than that of getting attention to the right objects.

This view is well illustrated by the following quotation from Professor Calkins' *Introduction to Psychology,* comprising all that she thinks it worth while to say about interest in the course of the five hundred pages.

"The term attention is a psychological pseudonym of the expression 'interest.' To be attended to means precisely to be interesting. . . . Things which are naturally uninteresting, such as dull books or difficult problems, may, it is true, be attended to, but they grow interesting in the process; for being interested and attending are one and the same experience. . . . In a strict and limited sense, the attended to or interesting is a relational experience. . . . 'Clear' and 'vivid' are other synonyms of attended to and interesting in this narrow use of the terms. . . . Narrowness of the fact attended to is evidently a constant characteristic. . . . The term 'attention' is often used in a very broad way, to cover not only the attention feeling, clearness, but the characteristic results and accompaniments of the feeling. . . . From the practical point of view attention certainly is significant, not for what it is in itself, but because

it is followed by memory and thought." ['01, pp. 137-146, *passim*] The original interests are stated by this author to be: first, in 'the unusual' (including the intense), and second in 'the instinctively interesting,' the latter being left undescribed save by the case (which seems better fitted to illustrate *acquisition* than instinct) of Miss Calkins' interest in "the waves that are breaking on the shore" and her neighbors' interests in "tranquilly playing cards or making Battenberg lace." ['01, p. 139 f.]

We must, it is true, allow psychologists the right so to restrict the meaning of the word interest if they choose; but, if they do so, they should give space and a name to the far more important fact, which interest has meant in common-sense usage, that certain sorts of behavior satisfy man—that is, are welcomed, and continued, and upon proper occasion readily repeated by him. The statement 'John is interested in music; James is not,' means more than that John listens attentively to music and is attentive to various requests to study music, and attends to the music he is told to study, while James does the opposite. It means, in addition and primarily, that John is satisfied by melodies and harmonies heard, scores seen, exercises practiced, musical ability attained and the like, as James is not; and that from identical external stimuli equally attended to, different results accrue in the two boys. The difference in attention is only one of many symptoms and results of this difference in satisfyingness. Miss Calkins' superior interest in the forces, moods and beauties of nature is, I venture to instruct her, more than her tendency to attend to natural objects and leave unnoticed the needles and threads, aces and ten-spots. It is a tendency to be satisfied by states of affairs which bore her neighbors. The instructive element of her interest in the waves that are breaking on the shore is the moving force which makes her attend now and in the future, and also in many other ways respond to them. This moving force is the readiness of certain neurones to act, manifested as the satisfyingness of certain states of affairs to her.

The educational doctrine of interest, then, should take

account of *all* the consequences of the satisfiers and annoyers. Their tendency to strengthen and weaken permanently the connections which they accompany or closely follow, whatever these be, is indeed much more important than their tendency to predispose toward attention to, and neglect of, certain objects and events. The latter is simply one special case of the former. What a man attends to is a matter of instincts and habits, like any other instincts and habits, modified like them in accord with the law of effect. The tendencies to be satisfied and annoyed which determine the lines of force of the law of effect, are prime determiners of man's intellect and character. Common sense calls them his 'wants' or 'interests,' and they may well retain that name.

Since the original satisfiers and annoyers for man as a species are the fundamental moving force in the common features of man's learning, the individual differences in their strength which characterize men singly may be expected to be fundamental causes of the differences among individuals in intellect, character and achievement. What little is known concerning individual differences and their causes justifies this expectation. Thus the original satisfyingness of manipulation of things and of 'experimentation' with them—that is, doing something to things and having them do something as a result —is relatively stronger in boy- than in girl-babies, whereas the original satisfyingness of gregariousness, attentiveness to human faces and voices, being approved and affectionately treated, and the like, is relatively stronger in girl- than in boy-babies.*

This difference between the sexes seems to play a large part in determining even so remote and artificial a matter as the choices of high school and college electives, boys showing a relatively stronger interest in the physical sciences and girls

*I use the words 'relatively stronger' here with the meaning that (A in boys)—(B in boys) is greater than (A in girls)—(B in girls), where A=the strength of the manipulation-experimentation interest and B=the strength of the gregarious-human emotional expression-affection interest. It is probably also true that (A in boys)>(A in girls and that (B in boys)<(B in girls), though that is not required for our argument.

in literature and psychology. The same difference *within either sex* seems also to be an effective determiner of achievement, though we have here no data earlier than the elementary-school age. By that age, and probably in infancy as well, the kind of man who is to become an eminent mechanical engineer shows notably differences from the man who is to become an eminent lawyer, in respect to the relative strength of these two satisfaction groups which we may call for short, the 'thing-action' and the 'human-feeling' interests. Kent ['03, p. 62] found the order of certain interests at the elementary-school period reported by two such groups to be as follows:

Boyhood Interests of Engineers and Lawyers

	Engineers					Lawyers				
	1.	2.	3.	4.	5.	1.	2.	3.	4.	5.
Science	36	37	8	1	0	0	0	11	33	33
Arithmetic	49	19	11	6	6	22	11	22	0	44
Geography	10	14	28	17	10	0	11	44	33	0
History	4	8	24	36	14	56	11	11	11	0
Literature	1	6	7	15	49	11	56	0	11	0

The numbers 1, 2, 3, 4, 5, at the top refer to the order of interest. The numbers beneath give the number of men reporting each subject as of the given degree of interest. Thus, of 82 engineers who mentioned science, 36 put it as the most interesting study of the five during their boyhood; while not one puts it as the least interesting.

Another instructive illustration of the significance of individual differences in being satisfied and annoyed is found in the general torpor and lack of zeal of the feeble-minded with respect to mental play, even when it is adapted to their degree of capacity. They do not learn, partly because they are not satisfied by new sensations, by doing something to have something happen, and by mental life for its own sake; and are not annoyed by monotony, vacuity, and failure. The apathetic ones often do not even care enough to play, while the active ones play at stereotyped animal-like occupations in which a gifted child could not engage without enlivening them by some intellectual artifice. It is not essentially false to say that the

stupid person *wants* to be stupid. A convenient means of estimating the significance of satisfaction in mental activity for achievement is to read Dr. Kuhlmann's account of his experiences in teaching some feeble-minded boys to play dominoes. ['04, pp. 394-402]

I quote typical statements:—"A, eleven years . . . a middle-grade imbecile. . . . In general he showed little interest in the game, none apparently, except in the mere stringing of blocks into a line, possibly some in matching, and most in his recognition of his having won." (This, here and later, was probably due to the notice and approving looks thereby got). . . . "B . . . fourteen years nine months . . . above A in general ability . . . but would come under the imbecile grade. . . . His interest seemed, too, to be in stringing out a line of blocks, perhaps some in matching, but most in winning. . . . D . . . ten years and four months . . . above the imbecile grade . . . had no difficulty in learning to play the domino game. . . . He showed considerable interest in winning. . . . E . . . twelve years ten months old . . . above the imbecile grade. In learning the domino game he showed no appreciable difference . . . from B. . . . F, eight years seven months old . . . of the active type. . . . To go through the regular procedure of a domino game proved to be beyond F's attainments; not perhaps because he did not understand the game, for occasional evidence showed that he probably understood as well as any of the other cases. . . . As a rule he showed no interest in either the procedure or in winning, yet a few times he applauded loudly when he won and got angry when his opponent won several times in succession."

THE TRUE SIGNIFICANCE OF PLASTICITY

Modern educational philosophers have emphasized the value of what they call the 'plasticity' of man in contrast to the stereotyped and rigid behavior of the lower animals. That the possibilities of education for him are so far beyond those for the other animals, is due, they say, to his being 'plastic' for so much longer a time, in so much larger a proportion of his behavior, and so much more fully in each feature of it.

This doctrine is harmless, though also helpless, so long as it

is taken to mean only the obvious facts that man does change at a rapid rate in each of many traits, and continues to change rapidly for many years. But one of two very misleading meanings is likely to be in the theory in the minds of those holding it, or at least to result in the minds of readers of their expositions of it. Either the 'plasticity' of man is thought of vaguely as a power possessed by him whereby he fits himself to live and thrive in any environment, or it is thought of as the absence of tendencies to respond to particular situations, each in a definite way. Plasticity in the first sense of a magic potency to get along with anything would doubtless be valuable to have, but does not exist. In the second sense of the mere absence of definite tendencies to response it would not produce the superior educability of man or anything else of value.*

It must be confessed that the standard expressions of the doctrine of plasticity lend support to these two errors. John Fiske says, in an often quoted passage:

"But this steady increase in intelligence, as our forefathers began to become human, carried with it a steady prolongation of infancy. As mental life became more complex and various, as the things to be learned kept ever multiplying, less and less could be done before birth, more and more must be left to be done in the earlier years of life. So instead of being born with a few capacities thoroughly organized, man came at last to be born with the germs of many complex capacities which were reserved to be unfolded and enhanced or checked and stifled by the incidents of personal experience in each individual. In this simple yet wonderful way there has been provided for man a long period during which his mind is plastic and malleable, and the length of the period has increased with civilization until

*There is also the argument from adaptation that if the young are helpless, the parents must needs be specially sagacious in order to keep them alive. Such is apparently Chamberlain's notion when he writes that "A comparatively witless infancy must augur the high intellectual achievements of the men and women of the race." ['00, p. 3.] This is, of course, only hypothetical in any case, and is proved false by the case of the kangaroo and opossum. Helplessness in the young can be prevented from causing their elimination by many other means than great intelligence in their parents.

it now covers nearly one third of our lives. It is not that our inherited tendencies and adaptations are not still the main thing. It is only that we have at last acquired great power to modify them by training so that progress may go on with ever increasing sureness and rapidity." ['83, p. 315 f.]

The third sentence has, and perhaps fairly, been interpreted in just these objectionable ways.

James, writing of the genesis of human reasoning, contrasts man with the lower animals as follows:—

"In them [the lower animals] fixed habit is the essential and characteristic law of nervous action. The brain grows to the exact modes in which it has been exercised, and the inheritance of these modes would have in it nothing surprising. But in man the negation of all fixed modes is the essential characteristic. He owes his whole preëminence as a reasoner, his whole human quality of intellect, we may say, to the facility with which a given mode of thought in him may suddenly be broken up into elements which recombine anew. Only at the price of inheriting no settled instinctive tendencies is he able to settle every novel case by the fresh discovery by his reason of novel principles. ['93, vol. 2, p. 367 f.]

This, especially the last sentence, is an unfortunate statement. James' contrary general doctrine that man has more instincts than any of the lower animals and that their elaborate interactions are the stimuli to his intelligent procedure is to be preferred to it. Here he apparently accepts the notion of instincts—as hard and fast tendencies, irrevocably 'fixed' and 'settled' in 'exact modes'—which he later so effectively demolishes. A mind given up to such might well be incapable of wide and rapid learning. But a mind equipped with many instincts such as nature really shows and such as James himself describes, may be all the more capable of wide and rapid learning. The facility with which a given mode of behavior "may suddenly be broken up into elements" is indeed in part dependent upon the number of the original behavior-series into which it enters. This, also, James elsewhere shows.

Henderson makes still clearer the view of plasticity which I am questioning. He says:

"Given such a system [the connection system of the human brain] and the readiness of learning depends on the absence therein of preferential associations between stimuli and responses. Wherever owing to heredity or training such preferential associations exist, there the power to utilize other than the associated responses is in part interfered with, and rendered slow or difficult. Heredity, therefore, endows one with the capacity to learn by the gift of a central nervous system with which all parts of the sensory and motor apparatus are closely connected, and in which the preferential associations tend to be few or feeble and the amount of diffusion in nervous currents correspondingly great." ['10, p. 90 f.]

Attributing man's greater ease and wider range and longer maintenance of modifiability or adaptability to an undefined 'plasticity' is simply one more case of leaving a tendency undescribed save by its results, and so encouraging the imputation of miraculous powers to it. What both insight into and control over human nature require is a statement of just what original connections—or what features of them—man has that the lower animals lack, or lacks that the lower animals have, which make him learn so much more than they do.

The notion that a mere *lack* of definite connections between situations and responses gives man his advantage in a rapidly changing and complex world seems plausible, but is thoroughly unsound. Its argument runs as follows:—By having no one response R_1 connected with a situation S_1 man is able to make in succession many responses R_1, R_2, R_3, R_4, R_5, etc. In a changing environment, proffering to each generation new situations and requiring from each generation different responses from those which sufficed its ancestors, a hundred responses, each connected to nothing in particular, are thus better than hundreds each with its preferential attachment to some one situation. It is unsound because, first, not having R_1 connected with S_1 gives no increased likelihood of responding thereto by R_2, R_3, R_4, etc. Not sneezing when one's nose is

irritated would, *per se,* add not a jot or tittle to the probability that one will blow his nose or go to a physician. If the connection with sneezing does prevent those other connections, it is by removing the irritation; if the annoying situation persists after the sneezing response, it is just as likely to produce diffusion into other responses if there has been, as if there has not been, a definite prior response. Further, that a hundred responses are each connected with nothing in particular does not mean that each is connected to everything in general. It could mean only that they were not connected with anything at all, and so could not be made at all. *Any connection has to be with something in particular.* Multiple response to a single situation occurs, not because *no* response is connected with it, but because *many* are, each according to some variation in it, such as its continuance after the preferred response to it has been made. Nor would there be any advantage in having a set of responses to one situation-group made in a random order rather than in always beginning with some one of them.

The real facts for which plasticity is a possible name are not negative but positive—not the poverty of man's unlearned connections, but their richness. Notable are the connections described under manipulation, vocalization, visual exploration, curiosity, mental control, the responses to approval and disapproval, the satisfyingness of forming and using secondary connections, and, of course, the strengthening of connections by the satisfyingness and annoyingness of their accompaniments and sequents. It is because man has these tendencies to an extent and degree unknown in the lower animals that he learns so much more, and so much more quickly, than they.

The instincts of theirs which he lacks and the 'imperfection' in him of instincts which are 'perfect' in them are not causes of his superiority. On the contrary, it is the instincts of his which they lack and the 'imperfection' in them of instincts which are more nearly 'perfect' in him which cause their inferiority.

WHICH INSTINCTS ARE OF MOST WORTH?

The more specific tendencies—such as to walk, run or climb, to go to sleep under cover, to pursue, catch and dismember small objects, to fear loud noises and the dark, to attack him who takes away one's possessions, and to show off before the opposite sex—may be put in one group and compared with the more general tendencies—such as curiosity, manipulation, vocalization, being satisfied by mental control or 'being a cause,' and the instincts of multiform physical and mental activity.

The more 'emotional' tendencies—such as to be loving, frightened, angry, amorous, disgusted or elated—may be compared with the more 'intellectual' tendencies—such as curiosity, visual exploration or multiform mental activity.

The more ancient tendencies, which hark back to prehuman times—such as climbing, rivalry for food and mates, fear of sudden loud noises—may be compared with the tendencies that have been born lately, since man became differentiated from the other primates.

In the way in which the question of worth in human structure or behavior is usually interpreted, there is roughly a balance—and a large one—in favor of the more *general*, more *intellectual* and more *modern* instincts. If we list the features of life which are the greatest means of human welfare—of health, industry, knowledge and justice—and note their more obvious sources in original nature, we are led to the instincts of curiosity, manipulation, mental control and multiform mental activity, in which reason begins to experiment freely with the facts of nature. In a world in which man makes his foods and drugs and measures their specific virtues to a calorie, the original food preferences and avoidances seem, and are, rather trivial means of protection. Where there are so many interesting occupations that serve man's good, where the killing of one fox costs the food of a man for a week, the interest in general manipulative play far outranks the hunting instinct. There is no longer any wisdom in submitting to big and domineering

men, loving pink-cheeked maidens, and hating those who meddle with us, that can compare with the wisdom of impersonal inquiry into the facts of life and their effect on human welfare.

It is of course true, with behavior as with structure, that the question of what is worth most requires qualification. That a brain, in the common interpretation of the question, is worth more for human welfare than a liver, does not deny that man's body would be equally valueless whether his brain or his liver were extirpated. Similarly to assert that general manipulation is worth more than breathing or swallowing does not deny that the former would be worth nothing to a man dead because lacking the instincts to breathe and swallow. The meaning attached to 'worth' in the comparison of indispensables is of course complex, and provocative of casuistic and evasive argumentation. I have trusted, and shall trust, the reader to keep in mind the qualifications and conditions without which such comparisons are meaningless.

Keeping them in mind, the law of effect—that is, the instinct of the neurones to preserve those connections by which neurones 'ready to conduct' are stimulated and to lose those by which neurones 'unready to conduct' are stimulated—and the instincts of multiform physical and mental activity, including curiosity, visual exploration, manipulation, vocalization and satisfaction at mental control or 'doing something and having something happen thereby,' are on a plane of worth far above the rest of man's equipment. Of these, the tendencies to make and enjoy making secondary connections beyond the direct bonds between sensed situation and immediate motor response to it are, by the same token, of the most worth. Those connections in which the sensory situation is replaced by an abstract plan, and the immediate muscular response by a contemplated action, 'tried out' in thought only, will, in the long run, do most for satisfying human wants. For, first, each can do the work of thousands of gross concrete behavior-series, providing for situations before they are met, for elements of situations never encountered by themselves, and for groups of

situations whose essential similarity the more animal-like connections could never reveal. In the second place, these tendencies to secondary, or so-called 'higher,' connections may rise free from the appetites of the single creature who exercises them and deal with the world in the interest of all men. Work and play with *'ideas'* of apples, blows, headaches, friendship, war, marriage, child-birth and family can be impersonal and ideal to an extent and a degree that would never be attained by direct responses to the concrete situations themselves. So, by his peculiar tendencies to go beyond these and to enjoy mental activity in general, man is becoming able to guide the mêlée of personal loves, hates, jealousies, rivalries, seizings, holdings, fightings, masterings and submittings by that impartial judgment of their effects which makes truth and that impartial judgment of their worth which makes justice.

Two different decisions as to the relative worth of the elements of man's original nature should be noted, of which one flatly opposes the answer given here, while the other gives our answer, but for a very different reason.

The former asserts that the more emotional instincts should outrank the more intellectual ones; and the older, the more recent. This view is cherished in one or another modified form by very many reactionaries who distrust the rationalization or intellectual control of human affairs; and by a few men of genius who believe that such control must, in the nature of things, be superficial and unsafe. Of the latter Stanley Hall has given the most vigorous exposition of the view that man's loves, fears, hates, disgusts and other direct and vehement behavior toward things and men should be the primary objects of education. If they are well managed, he thinks, the instincts productive of the arts and sciences can safely be left to themselves, while, if man goes astray in respect to any of these primitive appetites, his whole makeup may twist like a bad tool or rot like a bad apple.

Such a view is useful as a warning against the neglect of the less intellectual instincts, and against mistaken confidence

that superficial habits of thought will work back transformingly upon the deeper strata of feeling and action, but it does not weaken the force of the facts in favor of the importance, in life and in education, of the instincts which lead to thought, art, and science. It is precisely by the products of the intellectual instincts that the more vehement feeling instincts can be guided aright. 'To love aright,' says Hall, 'is the beginning of wisdom'; but to learn to love aright is possible only by ideal controls. What will attract sexually is in any case a result in large measure of circumstances; the question is whether there shall be, among these circumstances, ideals of health, mental and moral vigor and fitness for parenthood, preformed by the right direction of the intellectual instincts. Finding that the original maternal instinct is important and needs to be cherished and redirected in the midst of forces that threaten to prevent its exercise, Hall himself turns at once for aid to the instincts of general mental activity, trying to direct them to the study of children, of the value of mothering behavior to the mother as well as the child, and the like. He does not in practice believe that either stupidity or emotionality makes a good mother.

The danger of over-dignifying the early and emotional instincts is, first, that of encouraging the general *laissez-faire* of the 'nature is right' doctrine, and, in the second place, of laboriously trying to make much out of tendencies which have little in them for education in the world of today. We should, of course, make as much as we can out of everything in man's equipment; but we had best realize once for all that pouncing upon and wrestling, playing in cave-like places, hunting birds' eggs, returning a blow, fearing thunder, pitying men with sores, and the like are trivialities for education and life compared with instinctive manipulation of objects in general and delight in thought for thought's sake.

Such an attack upon the intellectual instincts as Stanley Hall's is, to my mind, less objectionable than the defense of pure thought with a capital T by absolutist philosophers, on the ground that it is above nature in its origin, and apart from

ordinary human wants in its functions. If the intellect's only merit consisted in transcending nature—in serving the interests of some super-human truth—in being above coming and going, getting and having, loving and hating, and other concrete appearances of man's impulsive struggle for life and satisfaction—we might well prefer to trust to the direct motor responses of men to work out human salvation by trial, error, and chance success. Intellect is not dignified by denying its natural origin or by removing it beyond usefulness to the crudest and trivialest of the wants of living men. But the worth or worthlessness of such a monstrosity need not be argued; for it nowhere exists. Intellect is of the same flesh and blood with all the instincts, a brother whose superiority lies in his power to appreciate, harmonize, use and save them all.

Its ideals are kith and kin of man's original hungers and thirsts and cravings. "What are ideals about?" asks Santayana with customary insight, "what do they idealize except natural existence and natural passions? That would be a miserable and superfluous ideal indeed that was nobody's ideal of nothing. The pertinence of ideals binds them to nature, and it is only the worst and flimsiest ideals, the ideals of a sick soul, that elude nature's limits, and belie her potentialities. Ideals are forerunners or heralds of nature's successes, not always followed, indeed, by their fulfilment, for nature is but nature and has to feel her way; but they are an earnest, at least, of an achieved organization, an incipient accomplishment, that tends to maintain and root itself in the world." ['05, vol. 1, p. 282]

ORIGINAL NATURE THE ULTIMATE SOURCE OF ALL VALUES

I have been at some pains to make it clear that the instinctive tendencies of man must often be supplemented, redirected and even reversed, and that, in the ordinary sense of the words, original nature is imperfect and untrustworthy. But in a certain important sense nature *is* right.

There is a warfare of man's ideals with his original tend-

encies, but his ideals themselves came at some time from original yearnings in some man. Learning has to remake unlearned tendencies for the better, but the capacity to learn, too, is a part of his nature. Intelligence and reason are fit rulers of man's instincts just because they are of the same flesh and blood. They are not foreign conquerors, imposing a law that is better because it comes down from above. They are sons of the soil, as indigenous as hunger and thirst, chosen to rule because their laws mean the best harmony of all the instincts. The native impulses and cravings of man have to be tamed and enlightened by the customs, arts and sciences of civilized life, but every item of these arts and sciences was first created by forces within man's own nature. Instincts may be trusted to form desirable habits only under a strong social pressure whereby the wants of one are accommodated to the wants of all, but the most elaborate and artificial moral training which a social group prescribes is still ultimately an expression of man's nature. The springs of ideals and of work in their service are surely not in the environment of rocks, rivers, animals and plants. Man's nature is right in at least the sense that it, not the world outside of it, is the source of whatever goods man has learned to esteem.

The impersonal wants, the cravings for truth, beauty and justice, the zeal for competence in workmanship, and the spirit of good will toward men which are the highest objects of life for man seem far removed from his original proclivities. They *are* remote in the sense that the forces in their favor have to work diligently and ingeniously in order to make them even partial aims for even a minority of men. But, in a deeper sense, they reside within man himself; and, apart from supernatural aids, the forces in their favor are simply all the good in all men.

The original nature of man, as we have seen, has its source far back of reason and morality in the interplay of brute forces; it grows up as an agency to keep men, and especially certain neurones within men's bodies, alive; it is physiologically de-

termined by the character of the synaptic bonds and degrees of readiness to act of these neurones; parts of it are again and again in rebellion against the higher life that the acquired wisdom of man prescribes. But it has evolved reason and morality from brute force; amongst the neurones whose life it serves are neurones whose life means, if a certain social environment is provided, loving children, being just to all men, seeking the truth, and every other activity that man honors; the wisdom that criticizes it is its own product; the higher life is the choice of its better elements: for whatever aberrations and degradations it imposes on man, its own virtues are the preventive and cure: and to it will be due whatever happiness, power and dignity man attains.

"Human nature, then, has for its core the substance of nature at large, and is one of its more complex formations. Its determination is progressive. It varies indefinitely in its historic manifestations and fades into what, as a matter of natural history, might no longer be termed human. At each moment it has its fixed and determined entelechy, the ideal of that being's life, based on his instincts, summed up in his character, brought to a focus in his reflection, and shared by all who have attained or may inherit his organization. His perceptive and reasoning faculties are parts of human nature, as embodied in him; all objects of belief or desire, with all standards of justice and duty which he can possibly acknowledge, are transcripts of it, conditioned by it, and justifiable only as expressions of its inherent tendencies."* These inherent tendencies, too, bear the impetus and means to their own improvement. The apostles and soldiers of the ideal in whom service for truth and justice has become the law of life need not despair of human nature, nor pray for a miracle to purge man of his baser elements. They are the sufficient miracle: their lives are the proof that human nature itself can change itself for the better —that the human species can teach itself to think for truth alone and to act for the good of all men.

*Santayana, *Life of Reason,* vol. 1, p. 289 f.

Bibliography of References Made in the Text

Acher, R. A. . . . . '10 *Spontaneous Constructions and Primitive Activities of Children Analogous to those of Primitive Man.* A. J. P., vol. 21, pp. 114-150.

Allin, A., and Hall, G. S. . . . . '97 *The Psychology of Tickling, Laughing and the Comic.* A. J. P., vol. 10, pp. 1-41.

Angell, J. R. . . . . '04 *Psychology.* References are to the third edition, '06.

Baldwin, J. M. . . . . '91 *Handbook of Psychology; Feeling and Will.*

Barker, L. F. . . . . '01 *The Nervous System and its Constituent Neurones.*

Bergson, H. . . . . '11 *Laughter* (Translation of Brereton and Rothwell.) The essays revised for the English edition of 1911, appeared originally in the Revue de Paris in 1900.

Boas, F. . . . . '11 *The Mind of Primitive Man.*

Bolton, F. E. . . . . '99 *Hydro-Psychoses.* A. J. P., vol. 10, pp. 169-227.

Borgquist, A. . . . . '06 *Crying.* A. J. P., vol. 17, pp. 149-205.

Bryan, W. L. . . . . '92 *On the Development of Voluntary Motor Ability.* A. J. P., vol. 5, pp. 125-204.

Burk, C. F. . . . . '00 *The Collecting Instinct.* Ped. Sem., vol. 7, pp. 179-207.

Burk, F. L. . . . . '97 *Teasing and Bullying.* Ped. Sem., vol. 4, pp. 336-371.

Burk, F. L. . . . . '98 *From Fundamental to Accessory in the Development of the Nervous System and of Movements.* Ped. Sem., vol. 6, pp. 5-64.

Calkins, M. W. . . . . '01 *An Introduction to Psychology.*

Chamberlain, A. F. . . . '00 *The Child. A Study in the Evolution of Man.*

Colvin, S. S. . . . . '11 *The Learning Process.*

Cooley, C. H. . . . . '02 *Human Nature and the Social Order.*

Craig, W. . . . . '08 *The Voice of Pigeons Regarded as a Means of Social Control.* Amer. J. of Sociology, vol. 14, pp. 86-100.

Darwin, C. .....'72 *The Expression of the Emotions in Man and Animals.* (References are to the American edition of 1910).

Dawson, G. E.....'00 *Psychic Rudiments and Morality.* A. J. P., vol. 11, pp. 181-224.

Dearborn, G. V. N....'10 *Moto-Sensory Development: Observations on the First Three Years of a Child.*

Donaldson, H. H.....'95 *The Growth of the Brain.*

Edinger, L. .....'96 *Vorlesungen über den Bau der Nervösen Centralorgane des Menschen und der Thiere.* Fifth edition.

Fiske, J. .....'83 *Excursions of an Evolutionist.*

France, C. J.....'02 *The Gambling Impulse.* A. J. P., vol. 13, pp. 364-407.

France, C. J., and Kline, L. W.....'99 *The Psychology of Ownership.* Ped. Sem., vol. 6, pp. 421-470.

Galton, F. .....'83 *Inquiries into Human Faculty.* (References are to the edition published in Everyman's Library.)

Gard, W. L.....'08 *Some Neurological and Psychological Aspects of Shock.* Ped. Sem., vol. 15, pp. 439-473.

Gesell, A. L.....'06 *Jealousy.* A. J. P., vol. 17, pp. 437-496.

Gilbert, J. A.....'94 *Researches on the Mental and Physical Development of School Children.* Studies from the Yale Psychological Laboratory, vol. 2, pp. 40-100.

Guillet, C. .....'00 *Recapitulation and Education.* Ped. Sem., vol. 7, pp. 397-445.

Gross, K. .....'95 *The Play of Animals.* References are to the English translation of '98.

Hall, G. S.....'97 *A Study of Fears.* A. J. P., vol 8, pp. 147-249.

Hall, G. S.....'99 *A Study of Anger.* A. J. P., vol. 10, pp. 516-591.

Hall, G. S., and Allin, A.....'97 *The Psychology of Tickling, Laughing and the Comic.* A. J. P., vol. 10, pp. 1-41.

Hall, G. S., and Saunders, F. H.....'00 *Pity.* A. J. P., vol. 11, pp. 534-591.

Hall, G. S., and Smith, T. L. .....'03 *Showing Off and Bashfulness as Forms of Self-consciousness.* Ped. Sem., vol. 10, pp. 159-199.

Hall, G. S.....'04 *Adolescence.*

Hall, Mrs. W. S...'96, '97 *The First 500 Days of a Child's Life.* Child Study Monthly, vol. 2, pp. 330-342, 394-407, 458-473, 522-537, 586-608.

Henderson, E. N.....'10 *Text-Book in the Principles of Education.*

Hirn, Y. .....'00 *The Origins of Art.*

Holmes, S. J.....'11 *The Evolution of Animal Intelligence.*

Hudson, W. H.....'92 *The Naturalist in La Plata.* (The bulk of the book appeared, however, at varying earlier dates in The Field, Longmans', The Nineteenth Century, etc.).

James, W. .....'93 *Principles of Psychology.*

Jennings, H. S.....'06 *Behavior of the Lower Organisms.*

Johnston, J. B.....'06 *The Nervous System of Vertebrates.*

Kaylor, M. A.....'09 *Feelings, Thought and Conduct of Children toward Animal Pets.* Ped. Sem., vol. 16, pp. 205-239.

Keatinge, M. W.....'07 *Suggestion in Education.*

Kent, E. B.....'03 *The Constructive Interests of Children.*

Kidd, D. .....'06 *Savage Childhood: A Study of Kafir Children.*

Kirkpatrick, E. A.....'03 *Fundamentals of Child Study.*

Kirkpatrick, E. A.....'09 *Genetic Psychology.*

Kline, L. W.....'98 *The Migratory Impulse versus Love of Home.* A. J. P., vol. 10, pp. 1-81.

Kline, L. W., and France, C. J.....'99 *The Psychology of Ownership.* Ped. Sem., vol. 6, pp. 421-470.

Kölliker, A. .....'96, '02 *Handbuch der Gewebelehre des Menschen.* Sixth edition, vol. 2, and vol. 3. V. von Ebner is the responsible author of vol. 3, but I follow custom in using Kölliker's name in reference.

Kropotkin, P. A.....'02 *Mutual Aid: A Factor in Evolution.* (The bulk of the work appeared at earlier dates as separate articles).

Kuhlman, F. .....'04 *Experimental Studies in Mental Deficiency: Three Cases of Imbecility (Mongolian) and Six Cases of Feeble-Mindedness.* A. J. P., vol. 15, pp. 391-446.

Ladd, G. T., and Woodworth, R. S....'11 *Elements of Physiological Psychology.*

Lancaster, E. G.....'98 *Psychology and Pedagogy of Adolescence.* Ped. Sem., vol. 5, pp. 61-128.

v. Lenhossèk, M.....'95 *Der Feinere Bau des Nervensystems.*

Lindley, E. H.....'97 *A Study of Puzzles.* A. J. P., vol. 8, pp. 434-493.

Loeb, J. .....'97 *On Egg Structure and the Heredity of Instincts.* Monist, vol. 7, pp. 481-493.

McDougall, W. .....'08 *Social Psychology.*

Marshall, A. ..... 90 *Principles of Economics.* (References are to the edition of 1891).

Marshall, H. R.....'93 *Pain, Pleasure and Aesthetics.*

Meumann, E. .....'07 *Vorlesungen Zur Einführung in die Experimentelle Pädagogik und ihre psychologischen Grundlagen.* References are to the second edition, 1911.

Miles, C. .....'95 *A Study of Individual Psychology.* A. J. P., vol. 6, pp. 534-558.

Moore, K. C.....'96 *The Mental Development of a Child.* Monograph Supplement No. 3 to the Psychological Review.

Morgan, C. L.....'85 *The Springs of Conduct.*

Mosso, A. ..... *Fear.* The English translation of '96 is from the fifth Italian edition.

Ordahl, G. .....'08 *Rivalry: Its Genetic Development and Pedagogy.* Ped. Sem., vol. 15, pp. 492-549.

Perez, B. .....'82 *Les trois premières années de l'enfant.* References are to the third edition of 1886.

Perez, B. .....'88 *L'enfant de trois à sept ans.*

Pillsbury, W. B.....'08 *Attention.*

Preyer, W. .....'81 *Die Seele des Kindes.* References are to the English translation; copyrighted in 1888 (Part I) and 1889 (Part II); entitled *The Senses and the Will* (Part I) and *The Development of the Intellect* (Part II).

Ratzel, F. .....'85-'88 *Völkerkunde.* References are to the English translation of '96 *(The History of Mankind),* from the second German edition of '94-'95.

Robinson, L. .....'91 *Darwinism in the Nursery.* Nineteenth Century, vol. 30, pp. 831-842.

Robinson, L. .....'93 *Darwinism and Swimming; A Theory.* Nineteenth Century, vol. 34, pp. 721-732.

Robinson, L. .....'94 *The Primitive Child.* North American Review, vol. 159, pp. 467-478.

Royce, J. .....'03 *Outlines of Psychology.*

Santayana, G. .....'05 *The Life of Reason.*

Saunders, F. H., and Hall, G. S.....'00 *Pity.* A. J. P., vol. 11, pp. 534-591.

Schneider, G. H.....'80 *Der Thierische Wille.*

Schneider, G. H.....'82 *Der Menschliche Wille.*

Sherrington, C. S.....'06 *The Integrative Action of the Nervous System.*

Shinn, M. W.....'93, '99 *Notes on the Development of a Child.* University of California Studies, Nos. 1-4. 1 and 2 appear under date of 1893; 3 and 4, under date of 1899.

Sisson, E. O.....'10 *The Essentials of Character.*

Slaughter, J. W.....'02 *The Moon in Childhood and Folklore.* A. J. P., vol. 13, pp. 294-318.

Smith, S. .....'08 *The Limits of Educability in Paramecium.* J. of Comp. Neurology and Psychology, vol. 18, pp. 499-510.

Smith, T. L., and Hall, G. S.....'03 *Showing Off and Bashfulness as Forms of Self-consciousness.* Ped. Sem., vol. 10, pp. 159-199.

Spencer, H. .....'58 *Essays: Scientific, Political and Speculative (Second Series).* References are to the American edition of '64.

Stanley, H. M.....'98 *Rational Fear of Thunder and Lightning.* A. J. P., vol. 9, pp. 418-419.

Stout, G. F.....'03 *The Groundwork of Psychology.*

Sully, J. .....'95 *Studies in Childhood.*

Sully, J. .....'02 *An Essay on Laughter.*

Sutherland, A. .....'98 *The Origin and Growth of the Moral Instinct.*

Thomas, P. F.....'07 *La suggestion; son rôle dans l'éducation.*

Thomson, J. A.....'08 *Heredity.*

Thorndike, E. L.....'98 *Animal Intelligence.* References are to the edition of 1911.

Thorndike, E. L.....'99 *The Instinctive Reactions of Young Chicks.* Psy. Rev., vol. 6, pp. 282-291.

Tracy, F. .....'93 *Psychology of Childhood.*

Trettien, A. W.....'00 *Creeping and Walking.* A. J. P., vol. 12, pp. 1-57.

Triplett, N. .....'98 *The Dynamogenic Factors in Pace-Making and Competition.* A. J. P., vol. 9, pp. 507-533.

Van Gehuchten, A....'00 *Anatomie du système nerveux de l'homme.* Third edition.

Veblen, T. .....'99 *The Theory of the Leisure Class.*

Washburn, M. F.....'08 *The Animal Mind.*

Watson, J. B.....'03 *Animal Education.*

Westermarck, E...'06, '08 *The Origin and Development of the Moral Ideas.*

Whitman, C. O.....'99 *Animal Behavior.* Biological Lectures from the Marine Biological Laboratory of Woods Holl, for 1898.

Woodworth, R. S.....'03 *Le Mouvement.*

Woodworth, R. S., and Ladd, G. T.....'11 *Elements of Physiological Psychology.*

Wundt, W. .....'92 *Lectures on Human and Animal Psychology.* References are to the English translation of '94.

Wundt, W. .....'93 Fourth Edition of the *Grundzüge der Physiologischen Psychologie.*

Ziehen, Th. .....'03 *Physiologische Psychologie der Gefühle und Affekte.*

INDEX

Abnormal psychology, evidence from as a criterion of unlearnedness, 23
Acher, R. A., 53, 202, 273
Acquired tendencies, intermixture with original tendencies, 2 f., 39 f.; inheritance of, 230 ff.
Acquisition, 51 f.
Activity, general mental, 141 ff.; general physical, 143
Addition, effect of emulating an absolute standard on, 289
Adornment, 140
Affection, 81 ff.
Allin, A., 163, 168, 169, 208, 275
Anatomy of original tendencies, 209 ff.
Angell, J. R., 147, 179
Anger, 76 ff.; situations provoking, 76; responses of, 76 ff.; value of, 283 ff.
Animal psychology, as a source of knowledge of original tendencies, 38
Animals, responses to, 52 f., 60 f.
Annoyers, original, 123 ff.; defined, 123 f.; listed, 124; explicable only by cerebral physiology, 125 ff.; in relation to the laws of readiness and unreadiness, 127 ff.; function of, in learning, 172 f.; importance of, 295 f.; relation of to doctrines of interest, 297 ff.; relation of to individual differences, 299 ff.
Anthropology as a source of knowledge of original tendencies, 37 f.
Anxiety, confusion of with fear, 57 f.
Appetite, loss of in pity, 103
Approval, responses to, 89 f.; responses by, 90 f.
Archaic adaptations in original nature, 280 f.
Aristotle, 164
Arms, position of, in anger, 77
Artistic instincts, 140
Attack, 70, 92, 120
Attention, 46 f.; to human beings, 88; and interest, 297 f.
Attention-getting, 88 f.
Authority, general misuse of, 105
Avoiding, 54

Babbling, 114, 135
Baldwin, J. M., 147
Barker, L. F., 211, 213, 214, 215
Bashfulness, 94 f., 96
Behavior, defined, 2; stages in the explanation of, 11 ff. *See* for specific forms of behavior, the specific tendencies in each case
Bergson, H., 164, 167, 208
Bio-genetic law, 254
Biographies of infants, 27 f.
Biting, 69, 74, 77
Boas, F., 241
Bolton, F. E., 203
Bonds, original, 6 ff. *See* also Original tendencies.
Borgquist, A., 208
Breathing, in fear, 59; in anger, 76; in laughing, 160 f.
Browne, C., quoted by Darwin, 77, 161, 166
Bryan, W. L., 261
Bullying, 103 f., 275 f.
Burk, C. F., 54, 262 f.
Burk, F. L., 104, 229, 249, 273, 275 f., 279 f.

Calkins, M. W., 180, 297 f.
Capacities, defined, 5 f.; of sensitivity, 44 ff.; of bodily control, 47 ff., 135 ff.; productive of learning, 171 ff.; for permanence of bonds, 193 f. *See* also Original tendencies.
Catharsis, 275 ff.
Cave-digging, 202
Censuses of opinions in the study of behavior, 28 ff.
Chamberlain, A. F., 88, 302
Chain-reactions, 126, 132 f.

Children, observations of original tendencies in, 27 f.
Clasping, 81, 82
Classification of original tendencies, 205 ff.; by their functions, 205 f.; by their situations, 206 f.; by their responses, 207 f.; by their genesis, 208
Cleanliness, 139
Clemens, S. L., quoted, 71 ff.
Clepsine, 239
Climbing, 47
Clinging, 47 f., 67, 81, 102
Clutching, 50, 67, 81
Collecting, 53 f.; gradual rise of, 262 f.; persistence of, 267 f.
Colvin, S. S., 147
Combat in rivalry, 70 ff. *See* also Fighting.
Combinations of original tendencies, 10, 93 f., 195 f.
Conduction, readiness for, 125 ff.; physiology of, 222
Confession, 98
Confinement, 55
Congruity, Hobhouse's theory of, 190 ff.
Conklin, quoted by Whitman, 239
Connections. *See* Bonds.
Connectors, 209
Conscience, 202
Consciousness, in angry behavior, 78 ff.; original tendencies to, 170 f.
Constructiveness, 138 f.
Contempt, responses to, 89 f.
Continuity of instincts, 237 ff.
Control, instinct of mental, 141 ff.
Convergence of stimuli, 216 f., 220
Cooley, C. H., 37, 91, 103, 113, 120
Cooing, 81, 135
Coöperation, 100
Counter-attack, 69
Courtship, 73, 97 f.
Craig, W., 159
Crepidula, 239
Crouching, 59, 120
Cruelty, 103 ff.
Crying, 74, 81, 91, 102, 135
Curiosity, 140 f.

Darkness, and fear, 61
Darwin, C., 49, 59, 76, 89, 160 ff., 166, 208
Dawson, G. E., 250
Dearborn, G. V. N., 27, 112
Defects in original nature, 277 ff.
Delayed original tendencies, physiology of, 228 f.; order of appearance of, 245 ff.; gradual waxing of, 260 ff.
Destructiveness, 138 f.
Dickens, quoted by Darwin, 78
Discipline, in schools, 89 f.
Discomfort. *See* Annoyers.
Dislike, confusion of with fear, 58
Display, 94, 95 f.
Distance, original responses to, 50
Distribution of stimuli, 216 f., 220
Disuse, 172
Domestic service, and gregariousness, 88
Domesticity, 55 f.
Donaldson, H. H., 229
Dread, confusion of with fear, 57
Duchenne, quoted by Darwin, 161

Eating, 50
Edinger, L., 213, 218
Effect, law of, 172 f.
Effectors, 209
Elements of original tendencies, action of, 10, 145 f., 195 f.
Emotional tendencies compared with intellectual in value, 306 ff.
Emotions, original, 150 ff.; difficulties in identifying, 150 ff.; internal bodily conditions accompanying, 151; as means of connection and representation, 153 f.; McDougall's inventory of, 154 ff.; relation of to expressive movements, 157 ff.
Emulation, 98 ff.
Engineers, boyhood interests of, 300

Environment, coöperation of, with original nature, 2 f., 39 f.
Envy, 101
Excess movements, 137 f.
Exercise, law of, 171 f.
Experimentation, instinct of, 142
Expression, of emotions, 157 ff.; supposed instinct of, 158 f.
Eye-movements in visual exploration of objects, 135 ff.
Eyes, covering in fear, 59; flashing in anger, 75, 77; lowering, 92, 95, 96; sparkling in laughter, 162

Faculties, alleged formation of connections by, 174
Falling, responses to, 49
Fashion, and approval, 90
Fatigue, in relation to the principle of readiness, 127 f.
Fear, 57 ff.; ambiguity of, 57 f.; responses in, 58 ff.; situations provoking, 60 ff.; specialization of original bonds in, 66 ff.; gradual rise of, in chicks, 263; persistence of, 268
Feeble-minded, lack of intellectual interests in, 300 f.
Feeling-tone. *See* Satisfiers and Annoyers.
Fighting instincts, 68 ff.; variety of, 68 ff.; in relation to attempted mastery, 70 ff.; in courtship, 73; in response to being thwarted, 73 ff.; value of, 274 f., 283 ff.
Filial instincts, absence of, 85
Fiske, J., 302 f.
Flushing, 76
Flynt, J., 55
Fondling, 81, 91
Ford, J. L., 164
Forel, A., 98
Fragments of original tendencies, action of, 10, 145 f., 195 f.
France, C. J., 277
Frowning, 77, 90

Galton, F., 87, 97
Gambling, 294
Gard, W. L., 63
General and specific original tendencies compared in value, 306 ff.
Germ-plasm and original nature, 2, 230
Gesell, A. L., 101
Gilbert, J. A., 262
Grasping, 50, 52, 135
Gratiolet, quoted by Darwin, 77
Greed, 102
Gregariousness, 85 ff.
Gross, K., 110, 142, 208
Guillet, C., 249 f., 273, 280

Habit-formation. *See* Learning.
Habitation, 54 f.
Haggerty, M. E., 117
Hair, erection of, in fear, 59
Hall, G. S., 28, 36, 37, 57, 61, 64, 75, 76, 96, 103, 163, 168, 169, 199, 200, 202, 206, 208, 229, 234, 235, 250, 251 f., 256, 257, 271, 272 f., 274, 275, 276, 279, 308, 309
Hall, W. S., 27, 63
Head, turning in fear, 59, 67; covering in fear, 59, 67; throwing back, 68; erection and protrusion of, 92; lowering, 92; averting in shyness, 95
Heart-beat, in fear, 59
Helpfulness, 106
Henderson, E. N., 13, 304
Hiding, 59, 67
High places, responses to, 64 f.
Hirn, Y., 140
Hitting, 69, 73, 77
Hoarding, 53 f.
Hobhouse, L. T., 185, 189
Holmes, S. J., 189 ff.
Home, 55 ff.
Homer, quoted by Darwin, 77, 166
Homesickness, 56 f.
Homicide, 294
Hooper, quoted by Westermarck, 84
Hooting, 90

Howitt, quoted by Westermarck, 83
Hunting instinct, 52, 104, 120, 267

Ideals, are products of original tendencies, 310 ff.
Ideas, absent from original situations and responses, 24
Ideo-motor action, 176 ff.; evidence against, 181 ff.; and moral education, 289 ff.
Imitation, 108 ff., 174 ff.; varieties of, 108 f.; absence of any general faculty of, 109 ff.; of particular forms of behavior, 117 ff.; alleged formation of connections by, 174 ff.
Immunization by early indulgence, 275 ff.
Imperfection of instincts, 48, 305
Incubation, genesis of, 238 ff.
Infallibility, doctrine of nature's, 271 ff.
Infants, responses to the instinctive behavior of, 81 ff.
Inoculation, theory of preventive mental, 275 ff.
Instinct, as a mythical faculty, 11, 13
Instincts, defined, 5 f.; stages in the description of, 11 ff.; of self-preservation, 14 f.; James' list of, 17 ff.; criteria of, 22 ff.; imperfection of, 48, 305; of food-getting, protection, flight and attack, 50 ff.; social, 81 ff.; of being satisfied and annoyed, 123 ff.; of vocalization, visual exploration and manipulation, 135 ff.; of curiosity and mental control, 140 ff.; of play, 144 ff.; of emotional conditions, 150 ff.; of self-expression, 158 f.; productive of learning, 171 ff.; anatomy and physiology of, 209 ff.; source of, 230 ff.; order and dates of, 245 ff.; value and use of, 270 ff.; number of, in relation to plasticity, 303 ff. *See* also Original Tendencies.
Intellect, selection for, 240 ff.
Intellectual instincts, 135 ff., 306 ff.
Interest, educational problem of, 297 ff.
Interests, 123 ff., 264 ff.
Interference, responses to, 68 f.
Inventories of original tendencies, 16 ff., 41 f.

James, W., 16, 20, 21, 22, 24, 37, 51, 52, 54, 61, 63, 65, 68, 85, 87, 94, 139, 151, 176, 178, 180, 182 ff., 193, 264 f., 266, 303
Jealousy, 101
Jennings, H. S., 185 f., 187, 192
Johnston, J. B., 217
Jumping, 47, 64, 67

Kant, E., 165
Kaylor, M. A., 202
Keatinge, M. W., 290 f., 292
Kent, E. B., 300
Keppel, F., 267
Kicking, 69, 73, 77
Kidd, D., 85
Kindliness, 102 ff.; dangers in, 283 ff.
Kinnaman, A. J., 117
Kirby, T. H., 289
Kirkpatrick, E. A., 37, 47, 60, 64, 74, 83, 109, 110, 116, 140, 158, 205
Kline, L. W., 55, 56, 208, 277
Kölliker, A., 210, 211, 213, 214
Kropotkin, P. A., 106
Kuhlmann, F., 301

Lacy, quoted by Darwin, 78
Ladd, G. T., 126, 151
Lancaster, E. G., 29 ff.
Language, original foundations of, 136
Laughter, 103, 120, 160 ff.
Lawyers, boyhood interests of, 300
Learning, original tendencies productive of, 171 ff.; limitations to, 173 f.; by imitation, 174 ff.; by ideo-motor action, 176 ff.; explan-

ations of by the law of exercise alone, 185 ff.; physiology of, 222 ff.; inheritance of, 230 f.
Leisure classes and the instinctive craving for objective approval, 90
v. Lenhossek, M., 214, 223
Lightning, and fear, 61
Lindley, E. H., 142
Lips, retracted in anger, 78
Loeb, J., 232
Love between the sexes, 97 f.

McDougall, W., 23, 37, 61, 62, 65, 68, 73, 86, 91, 95, 112, 116, 117, 121, 154 ff., 176, 181, 283, 284 f.
Manipulation, 135 ff.
Marks, use of in schools, 286 ff.
Marshall, A., 144
Marshall, H. R., 140, 226, 240
Mastery, 92 f.
Maternal instinct, 81 ff.
Medullation, and delayed instincts, 229
Memory, 192 ff.
Meumann, E., 270 f.
Migration, 55 ff.
Miles, C., 61
Modifiability. *See* Learning.
Modifiability of neurones, 222 f.
Moll, A., 98
Moore, K. C., 27, 49, 63, 112, 115
Moral education, 289 ff.
Morality, selection for, 240 ff.
Morgan, C. L., 190, 202, 204
Mosso, A., 57
Motherly behavior, 81 ff.
Motives, original foundations of, 123 ff.
Motor ability, development of with age, 261 f.
Mouth, opening in fear, 59; position of, in anger, 76; position of, in laughter, 160 f.
Movements, original control of, 47 ff.; of neurones, 224 ff.
Multiple response, 7 ff., 133 f., 137, 146 ff.
Mysophobia, specialization of, 139

Natural selection, and the origin of instincts, 235 ff.; and the order of appearance and disappearance of instincts, 253 f.
Natural tendencies *versus* original tendencies, 293
Nature's infallibility, doctrine of, 271 ff.
Nestling, 59, 67, 81, 97
Neurasthenia, in relation to the principle of readiness, 128
Neurones, action of in satisfyingness and annoyingness, 125 ff.; in emotional responses, 150 ff.; structure of, 209 ff.; arrangement of, 212 ff.; action of in sensitivity and conductivity, 222; action of in learning, 222 ff.
Noises, and fear, 62
Nudging, 92
Number of instincts in man, 303 f.
Nursing, 81 f.

Obstacles, responses to, 69
Opposition, alleged instinct of, 101
Ordahl, G., 70, 99, 100, 159
Order of appearance of delayed original tendencies, 245 ff.; of disappearance of transitory tendencies, 245 ff.
Original tendencies, defined, 1 ff.; names for, 5 f.; components of, 6 ff.; action of, 9 ff.; need of exact descriptions of, 16 ff.; criteria for discovery of, 22 ff.; sources of information, 27 ff.; to sensitivity, 44 ff.; to attentiveness, 46 f.; of gross bodily control, 47 ff.; of food-getting, 50 ff.; to hunt, 52 f.; to collect and hoard, 53 f.; to avoid, 54; to seek shelter, 54 f.; to be annoyed by confinement, 55; to migration and domesticity, 55 ff.; to fear, 57 ff.; to fighting, 68 ff.; to anger, 76

ff.; to respond to the behavior of other human beings, 81 ff.; productive of so-called imitation, 108 ff.; to be satisfied and annoyed, 123 ff.; to vocalization, visual exploration and manipulation, 135 ff.; to curiosity and mental control, 140 ff.; to play, 144 ff.; to random movements, 146 ff.; to emotional states, 150 ff.; to laughter, 160 ff.; to consciousness, 170 f.; productive of learning, 171 ff.; productive of remembering, 192 ff.; the action of fragments and combinations of, 195 f.; individual differences in, 197; modifiability of, 197 f.; scope of, 199 ff.; classification of, 205 ff.; anatomy and physiology of, 209 ff.; source of, 230 ff.; order and dates of, 245 ff.; value and use of, 270 ff.; defects in, 277 ff.; as ends, 286 ff.; as means, 289 ff.; and natural tendencies, 293 f.; number of in man, 303 ff.; relative worth of, 306 ff.; the ultimate source of all values, 310 ff.
Ownership, 102

Pain, irrational response to, 70; and annoyingness, 124, 129
Paleness, 59
Paralysis, 59, 77
Paramecium, 12, 187
Perez, B., 63, 74
Permanence, of bonds, 193 f.
Physiology, of original tendencies, 222 ff.; of delay and transitoriness, 228 f.
Pillsbury, W. B., 147
Pity, 103
Plasticity, significance of, 301 ff.
Play, 144 ff.
Pleasure, not synonymous with satisfyingness, 124; at being a cause, 143
Pointing, 51
Possession, 51 f., 102
Pouncing, 52
Preyer, W., 16, 27, 28, 63, 111
Protozoa, behavior of as key to the action of the neurones in learning, 224 f.
Protrusion, of lips, 111; of tongue, 112, 121
Psychasthenia, in relation to the principle of readiness, 128
Pugnacity. *See* Fighting.
Pulling, 74, 97, 135
Pushing, 69, 73, 74, 135

Questionnaires, use of in the study of original nature, 29 ff.

Rage, 76 ff.
Random activity, 8 f.; movements, 137 f., 146 ff., 274 f.
Ratzel, F., 83
Reaching, 50 f.
Reaction, varied. *See* Multiple response.
Readiness, the principle of, 125 ff.
Recapitulation theory, 245 ff.; evidence for and against, 254 ff.
Receptors, 209
Recreation, gregariousness as an element in, 86 ff.
Reflexes, defined, 5 f.; samples of, 16
Rending, 52, 120
Repulsion, 54
Resolution, Jennings' law of, 186 f.
Responses, as components of original tendencies, 6 ff.; need of exact description of, 20 ff.; classifications of original tendencies by, 207 f. *See* also Multiple response. For descriptions of specific responses *see* under the appropriate original tendency.
Restraint, escape from, 68 f.
Rivalry, 98 ff., 286 ff.
Robinson, L., 37, 48, 66, 203

Royce, J., 101, 108
Running, 47, 52, 59, 67, 120

Santayana, G., 309, 312
Satisfiers, original, 123 ff.; defined, 123 f.; listed, 124; explicable only by cerebral physiology, 125 ff.; and the principles of readiness and unreadiness, 127 ff.; function of, in learning, 172 f.; importance of, 295 ff.; relation to doctrines of interest, 297 ff.; relation to individual differences, 299 ff.
Saunders, F. H., 103
Schneidér, G. H., 16, 52, 53, 78, 249, 272, 273
Schopenhauer, A., 165
School work, and gregariousness, 88; and the approval-scorn series, 89 f.; and rivalry, 286 ff.
Scorn, responses to, 89 f.; responses by, 90 f.
Scott, quoted by Darwin, 77
Scratching, 69, 77, 135
Screaming, 59, 81
Secretiveness, 98
Selection, for intellectual and moral superiority, 240 ff. *See* also Natural Selection.
Selective fallacy in questionnaire reports, 33 ff.
Self-consciousness, 96 f.
Sensory capacities, 44 ff., 222
Sex behavior, 97 f.
Sex differences in mastery and submission, 93; in interests, 299 f.
Shakespeare, quoted by Darwin, 77 f.
Sherrington, C. S., 174
Shinn, M. W., 27, 63, 142
Shivering, 59
Shouting, 90, 120, 135
Shoving, 92
Shuddering, 59
Shyness, 94 f.
Sisson, E. O., 289
Situations, as components of original tendencies, 6 ff.; need of exact description of, 20 ff.; classification of original tendencies by, 206 f. For the situations in specific original tendencies, *see* under the name of the tendency.
Skill, original foundations of, 47 ff., 135 ff.
Slavish instincts, 97
Slaughter, J. W., 250
Sleeplessness, in pity, 103
Smiling, 81, 90, 91, 103, 120, 161 ff.
Smith, S., 185, 187 ff., 192
Smith, T. L., 96
Sneering, 90
Social instincts, 81 ff.
Sociology, as a source of knowledge of original tendencies, 38
Solitude, 63 f., 85 f.
Sounds, imitation of, 113 ff.; made in laughing, 163 f. *See* also Noises.
Source of original tendencies, 230 ff.
Sources of information concerning original tendencies, 27 ff.
Specialization, of bonds, in fear, 66 ff.; in fighting, 68 ff.
Spencer, H., 165
Spitting, 78
Stages of thought in the explanation of behavior, 11 ff.
Stanley, H. M., 62
Staring, 90, 92
Starting, 59, 67, 81
Stiffening, 68
Stout, G. F., 110
Strangeness, and fear, 60 ff., 65 f.
Submission, 92 f.
Suggestion, use of in schools, 289 ff.
Sully, J., 62, 168 f., 208
Supernatural, fear of, 65
Sutherland, A., 106, 241 ff.
Sweating, 59
Sympathetic induction of emotions McDougall's view of, 117 f.
Sympathy, 102 ff.

Synapses, 216 ff.; intimacy of, 221

Tapping, 261 f.
TARDE, G., 108
Tastes, responses to, 50
Teasing, 103 f., 275 f.
Teeth, clenched in anger, 77
TENNYSON, quoted by Darwin, 76
Theft, 277, 294
THOMAS, P. F., 289, 290
THOMSON, J. A., 231
THORNDIKE, E. L., 134, 227, 263
Thunder, 61
Thwarting of original tendencies, 73 ff.
Tickling, 166 ff.
Tormenting, 103 f.
TRACY, F., 110
Tramps, and the migratory instinct, 55
Transmission of acquired traits, 231 ff.
Transitoriness, of original tendencies, 39 f., 228 f., 245 ff., 264 ff.
Trembling, 59
TRETTIEN, A. W., 47
TRIPLETT, N., 100
TYLOR, E. B., quoted by Sutherland, 106

Universality, as a criterion of unlearnedness, 22, 23
Unreadiness of conduction units to conduct, 126 ff.
Use, law of, 171 f.; of original tendencies, 270 ff.
Utility theory of the order of original tendencies, 252 ff.; evidence for, 258 f.

Value of original tendencies, 270 ff.
VAN GEHUCHTEN, A., 210, 214, 215, 216, 218, 219, 223
Variability of men in original tendencies, 197
Varied reaction. *See* Multiple response.
VEBLEN, T., 90, 143
VENIAMINOF, quoted by Westermarck, 84
Visual exploration, 135 ff.
Vocalization, 135 ff.
VON BAER, quoted by Guillet, 240

Walking, 47
Wants, original foundations of, 123 ff.
WASHBURN, M. F., 179
Water, original responses to, 202 ff.
WATSON, J. B., 117, 229
WESTERMARCK, E., 83
WHITMAN, C. O., 238 f.
Wind, responses to, 63
WOODWORTH, R. S., 47, 126, 151
Workmanship, Veblen's instinct of, 143 f.
Writhing, 68, 74
WUNDT, W., 177, 234 f.

ZIEHEN, Th., 128

Date Due

FEB 25 '67
OCT 26 '67

3646

LB
1051
T52
v.1

Thorndike.
Educational psychology.

BCL A. 10632

WASHINGTON COLLEGE
LB1051 .T52 main
Thorndike, Edward L/Educational psycholo
3 5110 00104 0290